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An Investigation of the Efficacy of Direct and Indirect AAC Service Provision via Telepractice

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AN INVESTIGATION OF THE EFFICACY OF DIRECT AND INDIRECT AAC SERVICE PROVISION VIA TELEPRACTICE

A Dissertation Presented

by

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DEDICATION

To my patient and loving husband, Justin, who has supported me every step of the way. A special thanks to my parents for not only providing big shoes to fill, but for inspiring me and empowering me to pursue my dreams and make a difference.

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ABSTRACT

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There is a growing population of individuals using Augmentative and Alternative Communication (AAC) in need of evidence-based intervention from highly qualified personnel. However, not all speech pathology programs offer AAC coursework and/or practicum opportunities, and practicing speech-language pathologists (SLPs) report low levels of confidence and expertise in working with individuals using AAC. Therefore, there is a need to develop more innovative pre-professional training programs to better equip the next generation of SLPs with the knowledge and skills necessary to provide high-quality, evidence-based AAC interventions. Telepractice is emerging as an inventive way to provide both direct and indirect intervention services, and could theoretically be used to support pre-professional training by providing clinicians the opportunity to engage in direct services with individuals using AAC concurrently while receiving supervision from a skilled mentor.

A thorough review of the literature revealed limited information and data regarding tele-AAC for direct and indirect service delivery. This investigation examined the feasibility and effectiveness of utilizing telepractice to train pre-professional clinicians regarding AAC interventions while in the context of service delivery both on-site and via telepractice. A single-subject, multiple baseline design was employed to examine the impact of real-time supervisory guidance offered via telepractice to pre-professional clinicians (Active Consultation) on the performance of the clinicians and the clients in each service delivery condition. Data was gathered on the number of target language acts modeled by the clinicians and generated by the clients when Active Consultation was provided. The results supported the use of telepractice for supervision, and as a service delivery method for AAC users.

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THE AAC POPULATION, EVIDENCE-BASED PRACTICE AND PRE-PROFESSIONAL TRAINING

Introduction

Augmentative and alternative communication (AAC), a subset of assistive technology (AT), is any mode or method of communication that enhances or replaces verbal speech, either temporarily or permanently. AAC is therefore a critical tool for individuals with complex communication needs and represents a range of adapted and individually customized supports, from low-technology tools to highly technical devices. AAC includes gestural and manual forms of communication, as well as the use of picture-, symbol-, and text-based systems to help individuals express their wants and needs, participate as fully as possible in activities of daily living, access curriculum and academic pursuits, as well as form and sustain social relationships. AAC can therefore meet the diverse needs of individuals presenting with significant expressive language deficits resulting from congenital, developmental, intellectual, or acquired disorders and/or disabilities. As such, demographic data of AAC device users varies considerably by disorder and age.

It is estimated 3.5 million Americans with complex communication needs use AAC (Beukelman &Mirenda, 2005). In the State of Massachusetts alone, approximately 9,854 students require and can benefit from AAC interventions (Massachusetts Department of Elementary and Secondary Education, 2012) from highly qualified personnel. The American Speech-Language-Hearing Association (ASHA) acknowledges that AAC is a multidisciplinary field that is within a speech-language pathologists (SLPs) scope of practice. It is therefore essential that future SLPs demonstrate knowledge and

clinical skills in the area of AAC.

Despite ASHA certification mandates, not all speech pathology programs offer AAC coursework. As a result, there is a need to develop more innovative pre-professional training programs to better equip the next generation of SLPs with the knowledge and skills necessary to provide high-quality, evidence-based AAC interventions. Telepractice is emerging as an inventive way to provide both direct and indirect intervention services, and could theoretically be used to support pre-professional training by providing clinicians the opportunity to engage in direct services with individuals using AAC concurrently while receiving supervision from a skilled mentor. Research involving both AAC and telepractice is limited; however, there is recent evidence that supports a telepractice AAC training model (Quinn, Beukelman, & Thiessen, 2011; Styles, 2008), and the clinical feasibility of direct and indirect Tele-AAC services (Boisvert, Hall, Andrianopoulos, & Chaclas, 2012).

In the sections that follow, national and state demographics of the population of AAC users, service delivery and evidence-based AAC interventions, pre-professional training, as well as the provision of telepractice services will be discussed with respect to their relevance to the proposed study. Population demographics were extrapolated from existing data, and it is important to note that there are limited AAC-specific demographic data on a national and state level. Furthermore, the evidence-based intervention methods described were not delivered via telepractice, as there is limited evidence of such services to date.

The Demographic Profile of the AAC Population

There is limited published data regarding demographic information among AAC users. A review of the literature revealed a small number of published studies (Binger & Light, 2006; King, 1998; Matas, Mathy-Laikko, Beukelman, & Legreseley, 1998) that describe the demographic composition and provision of services for this population. According to Beukelman and Mirenda (2005), approximately 1.3% of individuals, or 3.5 million Americans, have significant expressive language deficits. These figures are mirrored by the American Speech-Language-Hearing Association (ASHA, 2008), which, based on a compilation of investigations, suggests that 8-12 of every 1000 individuals possess such severe communication impairments that may warrant the use of AAC.

Significant expressive language deficits can be the result of a number of different developmental and/or acquired etiologies. A survey conducted by the Australian researchers, Bloomberg and Johnson (1990), revealed that for individuals under the age of 21 with severe communication impairments, the majority of causes were related to developmental delays (100%), autism (88%), and cerebral palsy (65%); whereas, for those between the ages of 22-40 the etiologies were associated with unknown causes (40%), psychosis (40%), infectious diseases and tumors (39%) in comparison to strokes (96%), surgery (83%), and progressive disabilities (66%) in individuals 40 years and older. Moreover, these researchers found that nearly 50% of individuals with severe communication deficits were school-aged (i.e., between 2 and 21 years of age).

Similar demographic estimates are reported in the United States, where common etiologies include congenital, developmental and genetic disorders, as well as autism spectrum disorders (ASD), cerebral palsy, apraxia, stroke, Parkinson's Disease,

Huntington's chorea, Amyotrophic Lateral Sclerosis, multiple sclerosis, and traumatic brain injury, and occur in all socioeconomic, racial, and ethnic groups (Downey & Hurtig, 2003). With respect to the school-aged population within the United States, it is estimated that 12% of preschoolers (Binger & Light, 2006) and 6% of the special education population (Matas et al., 1985) present with complex communication needs. However, comprehensive demographic data are lacking regarding the composition of individuals using AAC on both state and national levels. It is plausible for more tightly controlled educational data to be gathered by the State Department of Education that include estimates of AAC users among the school-aged population.

The AAC Population within the State of Massachusetts

The Massachusetts Department of Elementary and Secondary Education (ESE; 2012) reports that 17% of students receive special education services. A comprehensive review of district-specific, demographic data mirrors this figure and suggests that approximately 16.426% of children in Massachusetts receive special education services (ranging from 2.6 – 44.1% of students per district). These estimates approximate that 164,238 students, ranging from two to 10,898 students per district, receive special education services in Massachusetts (please see Appendix A). Using the more conservative demographic estimates provided by Matas et al. (1985), one can calculate that approximately 9,854 of students that are registered for special education services in the State of Massachusetts are probably nonverbal and currently using, or in need of, AAC services. Furthermore, according to the Massachusetts Department of Public Health (MDPH, 2005) 3% of special education students have a diagnosis of autism. Therefore,

these estimates suggest that approximately 4,927 students in the Massachusetts special education system have a diagnosis of autism and that up to 60% of these individuals with ASD are unable to communicate (Center for AAC & Autism, 2009).

Evidence-Based AAC Services: Language Acquisition of Individuals Using AAC

The nature, severity and complexity of the communication deficits exhibited by the AAC population necessitates that speech-language pathologists (SLPs) not only be well trained and qualified, but deliver intervention services that are evidence-based. ASHA (2004) describes that the provision of AAC assessment and intervention services falls within a SLP's scope of practice. In fact, according to ASHA "AAC is a multidisciplinary field that requires skills that transcend the typical discipline-specific training" (2002, p. 1) and SLPs should be prepared to serve as leaders on AAC teams given that communication is "a primary area of concern and one that influences all other aspects of daily living and life skills" (ASHA, 2004, p. 13).

In addition, SLPs must acquire refined skills as individuals reliant on using AAC pose unique challenges regarding their language development. Language development of AAC users is affected by the interplay between factors intrinsic to the individual, such as speech production, cognitive, and physical ability, as well as extrinsic factors related to the AAC system characteristics (Blockberger & Johnston, 2003; Nelson, 1992; Romski, Sevcik, & Adamson, 1997; Sutton, Soto, & Blockberger, 2002). Furthermore, language acquisition and development for this population involves interpretation and input from a communication partner (Bedrosian, 1997). Paul (1997) summarized language

development for an AAC device user as a "triadic model of language acquisition consisting of the child, AAC system, and partner" (p. 181).

Individuals using AAC may present with atypical developmental profiles; however, there is evidence to suggest that individuals with complex communication needs using AAC progress through typical stages of language development, ignoring the subtleties of phoneme and prosodic development, per se (Letto, Bedrosian, & Skarakis-Doyle, 1994; Paul, 1997). Therefore, some AAC systems are designed with the flexibility to meet the progressive language needs of the individual, and enable linguistic communication and interfaces to ensure an individual has access to core vocabulary from a variety of word classes with the potential to make morphological adaptations (Soto & Zangari, 2009).

A number of AAC systems are intended to promote language development through systematic, evidence-based intervention. One such company, Prentke Romich Company (PRC), manufactures AAC devices with Unity®; which is a proprietary vocabulary program that provides a lexical foundation for communication that includes spelling, word prediction, and single-meaning picture options that utilize consistent sequences and patterns (PRC, 2012a). AAC software interfaces, such as Unity®, enable AAC communicators to advance through stages of typical language development. In fact, to facilitate this, PRC offers a framework for language development and intervention known as the AAC Language Lab (PRC, 2012b). The Language Lab, which is closely aligned with Brown's Stages of Syntactic and Morphological Development (1973), details six stages of expressive language acquisition, namely: 1) use of one word at a time; 2) use of two- and three-word phrases; 3) construction of phrases and early

sentences including progressive -ing verbs and plural nouns; 4) demonstration of appropriate grammar and sentence structure with generation of questions and negative statements; 5) use of sentences including possessive nouns, third person present tense verbs and regular past tense; and 6) consistent use of correct grammar and syntax in complex sentences (PRC, 2012b).

Language Intervention for the AAC Population

Given the intrinsic factors unique to each individual needing AAC, it is likely that an AAC device user will progress at a different rate than is typical. However, language development and language acquisition for AAC users must be, and can be systematically addressed during intervention. Light (1989) describes four basic competencies essential to successful implementation and utilization of AAC systems, namely: operational, linguistic, strategic and social competence. All of these skills are important for a device user to develop; yet linguistic competency is essential to the successful use of AAC for the purposes of expressive language acts. Therefore, it is critical to engage AAC device users in language intervention with the intent to methodically advance an individual's language development and skill acquisition.

As with typical language development, individuals start expressing single words and then combine words to create syntactical forms conveying greater meaning. However, there is evidence to suggest that children using AAC may have difficulty with linguistic skills, such as progressing from single-messages to multi-word messages (Binger & Light, 2007; Smith & Grove, 2003). Difficulty may be due to degradation of any one or more aspects of Paul's (1997) triadic model of language acquisition; namely

factors intrinsic to the individual (such as physical and cognitive abilities), related to the device, or associated with the communication partner. Researchers and theorists describe input-output asymmetry (Binger & Light, 2007; Smith & Grove, 2003; Sutton, et al., 2002), which is the disproportionate relationship between the input an AAC user receives (typically spoken input) and the expected output (which, for AAC device users, is a physical process). Embedding augmented input within language intervention strategies counteracts this asymmetry and ultimately facilitates language acquisition for individuals using AAC.

There is limited empirical evidence regarding language intervention for individuals using AAC. Typically, direct instruction strategies have been employed to teach symbol production, but there is a growing body of evidence advocating for more naturalistic approaches that place an emphasis on language input for instructional purposes (Harris & Reichle, 2004). Binger and Light (2008) completed a comprehensive review of the literature to determine the morphological and syntactic acquisition of individuals using AAC. Their findings revealed that among the 31 relevant studies published, the majority of AAC users in these published studies demonstrated difficulties acquiring expressive grammar skills, such as the use of multi-word/symbol productions, morphology and syntax. These authors concluded that intervention approaches for AAC device users should provide appropriate clinical services to address grammar skills.

The intervention techniques reported in the 31 investigations studied by Binger and Light (2008) varied considerably; however, the majority of investigations included use of the participants' AAC devices or augmented input to address syntactical (Binger & Light, 2007; Bruno & Trembath, 2006; Nigam, Schlosser & Lloyd, 2006; Trudeau, et al.,

2010), and morphological goals (Binger, Maguire-Marshall & Kent-Walsh, 2011). The heterogeneity of the AAC population, combined with the challenges associated with language development for this population, necessitates individually tailored language intervention that utilizes an individual's unique communication system.

A number of evidence-based strategies incorporate augmented input such as aided AAC modeling, a System for Augmented Language (Romski & Sevcik, 1996; Romski, et al., 1997), and aided language stimulation (Goossens', 1989). These intervention strategies help advance an AAC user's skills by using AAC systems to model targets, as well as offer expansions (reiterating an utterance while adding additional detail), recasts (adjusting or rephrasing an utterance without adding more detail), build-ups and break-downs (emphasizing specific salient features of an utterance or expanded utterance). These approaches capitalize on the critical relationship between a language learner and their more advanced partner that is essential to language development.

Vygotsky (1978) introduced the concept of a "Zone of Proximal Development" which is purported to be "the difference between the child's actual level of development as determined by independent performance and the child's potential level of development accomplished through collaborative interactions with the more skilled partner" (Letto, et al., 1994, p. 152). The clinical interaction between the client and the clinician can help an AAC device user move through their Zone of Proximal Development (ZPD) to learn new, and more advanced, communication acts. Clinicians employing these augmented input strategies described above can help contribute to an individual's acquisition of specific skills by providing immediate models that are aligned with the AAC users thoughts (Blockberger & Johnston, 2003). There are a paucity of studies supporting intervention

that uses augmented input by both the clinician (Beck, Stoner & Dennis, 2009; Binger, Berens, Kent-Walsh & Taylor, 2008; Binger & Light, 2007; Bruno & Trembath, 2006; Dada & Alant, 2009; Goossens', 1989; Harris & Reichle, 2004; Johnston, McDonnell, Nelson & Magnavito, 2003; Light, 1997; Romski & Sevcik, 1996; Sevik, Romski, Watkins & Deffebach, 1995; Solomon-Rice & Soto, 2009) and an individual's communication partner (Binger, Kent-Walsh, Berens, Del Campo & Rivera, 2008; Binger, Kent-Walsh, Ewing & Taylor, 2010; Romski, Sevcik, Adamson, Cheslock, Smith, Barker & Bakeman, 2010).

Pre-Professional Training for Meeting the Language Needs of AAC Users

ASHA has published official statements regarding the provision of services that fall within an SLP's scope of practice. ASHA's published policies and documents (ASHA 2002, 2004, 2005) provide ample support and evidence for the fact that, irrespective of whether or not an SLP intends to specialize in AAC, it is essential that SLPs be trained appropriately to ensure the provision of high quality AAC services. In 1994 Koul and Lloyd conducted a survey that revealed an increase of AAC course offerings at academic institutions, rising from 32.3% in 1982 to 62% in 1994. More recently, Costigan and Light (2010) found that up to 73% of such programs offer AAC courses. Data compiled from current university programs in Communication Sciences and Disorders support that approximately 71.54% of programs offer at least one course in AAC (please see Appendix B). It should be noted that data from each of these surveys were obtained using different methodological approaches and, as such, one is unable to make direct comparisons between the survey data. Nonetheless, it appears that there has

been a steady increase in course offerings among programs in Communication Sciences and Disorders and Speech Language Pathology in the past 15 to 20 years.

Despite an increase in course offerings in AAC, the majority of academic programs offer just one AAC course, which is typically comprised of introductory content. To exacerbate matters, Costigan and Light (2010) discovered that instructors are oftentimes not experts in AAC, and a significant number of pre-professional programs fail to expose future clinicians and professionals to AAC. Ratcliff and Beukelman (1995) found that although 67% of programs offering AAC coursework included a hands-on laboratory component, on average, only "28% of the students in any given institution were reported to obtain some clinical clock hours in AAC" (p. 66). These inadequacies related to pre-professional training within the field of SLP are also evident in clinical practice and school settings, where SLPs report low levels of AAC expertise (Simpson, Beukelman & Bird, 1998) and less than adequate educational preparation (Marvin et al., 2003). Although limited in number, these investigations have significant implications, not only regarding the quality of training for SLPs, but also for the quality of services provided to individuals using, or in need of AAC.

Innovative Training Methodologies

Poor instruction coupled with scarce clinical practicum opportunities perpetuates the existing trend of inadequately trained clinicians and personnel in AAC. To alleviate this situation, Costigan and Light (2010) proposed that online, videoconferencing techniques could enable "AAC experts to efficiently and cost-effectively address large, geographically dispersed audiences and enable flexible training schedules for students"

(p. 210). The use of online technologies for the delivery of services is referred to as telepractice within the field of speech-language pathology. Telepractice is defined as "the application of telecommunications technology to deliver professional services at a distance by linking clinician to client, or clinician to clinician, for assessment, intervention, and/or consultation" (ASHA, 2010, p. 1). Recent advancements in technology empower professionals to provide services where there is a shortage of professionals and/or specialists (Mashima & Doarn, 2008). Therefore, telepractice enables experts in the field of AAC to engage in intervention, assessment, education, and supervision irrespective of their geographical locale.

Telepractice is feasible and practical for pre-professional programs in SLP to implement, as it is possible to connect graduate students to experts in AAC for training and academic purposes. Empirical research utilizing telepractice for consultation, supervision and fieldwork in AAC is limited; however, preliminary data provide support of such a clinical and training model for telepractice and AAC. For example, Styles (2008) evaluated patient satisfaction with AAC assessments and follow-up services that were conducted via telepractice. Styles reported, "participants indicated an 88% satisfaction with the videoconference technique for assessment and a 95% satisfaction with the review videoconference sessions" (2008, p. 415). Quinn, et al, (2011) used Virtual Network Computing (VNC) to successfully guide pre-professional students through 11 operational skills needed to program visual scene displays on an AAC system.

With respect to the pedagogy of pre-professional training in AAC, advancements in technology and published empirical data support the implementation of AAC into curricula and practicum experiences in institutions of higher education. This will equip

pre-professionals in SLP with the knowledge and practical skills required by ASHA with respect to AAC and communication modalities. The current quality of technology enables experts in the field of AAC to teach pre-professionals the content needed for one to acquire the theoretical constructs, which are necessary for practicing clinicians. In addition, telepractice can serve as the vehicle by which AAC experts can supervise pre-professionals in the context of conducting assessments, interventions, and language-based strategies. Furthermore, telepractice can be used for direct service delivery to individuals in need of AAC services. It is possible that through innovative application of currently available technologies, pre-professionals can be adequately prepared to deliver high-quality, evidence-based AAC services.

Objectives and Aims

The purpose of this investigation was to empirically demonstrate the feasibility and effectiveness of utilizing telepractice as a method to train pre-professional clinicians regarding the provision of evidence-based AAC interventions, while in the context of on-site versus telepractice service delivery for individuals using AAC. The study provided empirical evidence regarding the use of telepractice and its implementation as a valid and appropriate service delivery method for individuals in need of AAC.

The focus of this study was trifold. It was designed to examine (1) the augmented input, in the form of target vocabulary and phrases modeled, offered by pre-professional clinicians who were receiving real-time consultation via telepractice (Active Consultation), as well as (2) the impact of this guidance on the productions generated by the clients receiving services. In addition, the clinicians provided services to AAC users

on-site (in person) and off-site (via telepractice). The student progress data gathered during each session was compared for those individuals receiving services on-site to those participating in telepractice intervention in an effort to (3) determine the effectiveness of tele-AAC services. A multiple baseline design was used to systematically address each of these foci, and data was gathered on the number of unprompted (i.e., independent) and prompted targets modeled and/or generated in an effort to examine the effect of the supervision on clinician and client performance in each condition.

This investigation addressed the following research questions:

Research Question 1: Is there an increase in the unprompted production of target phrases modeled by pre-professional clinicians when receiving Active Consultation?

Null Hypothesis 1: There is no difference between the number of prompted versus unprompted target phrases modeled by the pre-professional clinician when receiving Active Consultation.

Alternative Hypothesis 1: There are a greater number of unprompted versus prompted target phrases modeled by the pre-professional clinician when receiving Active Consultation.

Research Question 2: Is there an increase in the client's unprompted production of target phrases on his/her device when the pre-professional clinician receives Active Consultation?

Null Hypothesis 2: There is no difference between the number of prompted versus unprompted target phrases produced by the client when the treating pre-professional clinician receives Active Consultation.

Alternative Hypothesis 2: There are a greater number of unprompted versus prompted target phrases produced by the client when the treating pre-professional clinician receives Active Consultation.

Research Question 3: Is there a difference in client outcome data, as measured by the number of unprompted phrases versus prompted phrases produced by each client, when treatment is provided on-site or via telepractice?

Null Hypothesis 3: There is no difference in client outcome data, as measured by the number of unprompted phrases versus prompted phrases produced by each client over the course of treatment, when treatment is provided on-site versus via telepractice.

Alternative Hypothesis 3: There is a difference in client outcome data, as measured by the number of unprompted phrases versus prompted phrases produced by each client over the course of treatment, when treatment is provided on-site versus via telepractice.

CHAPTER II

METHODOLOGY

Research Design

This purpose of this study was to examine the impact of Active Consultation on target phrases generated by pre-professional clinicians and AAC device users, and whether or not there was a difference in AAC intervention outcomes when services were provided on-site versus via telepractice. In order to achieve this, this study utilized an experimental, single-subject multiple-baseline design (Kazdin, 2011), which examined unprompted and prompted target phrases generated by the pre-professional clinician and the client during each stage of the investigation.

Single-subject research designs, stemming from investigations within the field of psychology, are well suited for studying the effectiveness of tools and systems utilized when treating disordered populations (McReynolds & Kearns, 1983). Given the heterogeneity of the AAC population, it is logical to compare the outcomes of intervention within individual participants. Single-subject research enables investigators to analyze the effects of an intervention on an individual while using that individual as his or her own control.

Although single subject research is able to account for individual differences when measuring behavioral changes, the personalized nature of these designs poses a major limitation. More specifically, using participants as their own control restricts how study outcomes are generalized to the population at large (known as a threat to external validity). In order to address this threat to external validity it is important to methodically replicate the study (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005), and therefore

construct a study that clearly outlines the conditions and procedures (Horner et al., 2005; McMillian, 2004). Through careful experimental control and replication across other participants, single-subject research can enhance external validity and can shed insight into the effects of interventions on a larger population. Furthermore, the compilation of individual intervention data provides a summary of an overall treatment effect (Kazdin, 2011) for the study.

In order to examine the impact of Active Consultation on the target phrases and vocabulary produced by the pre-professional clinicians and the clients a multiple-baseline design was used. This design "demonstrates the effect of an intervention by showing that behavior changes when and only when the intervention is applied" (Kazdin, 2011, p. 145). This investigation involved four (4) pre-professional clinicians, four (4) AAC device users, and two (2) supervising clinicians well versed in AAC intervention. Participants were divided into two groups: On-Site versus Telepractice (with two, consistent client-clinician cohorts in each). The multiple-baseline design consisted of six (6) phases; two (2) baseline phases and four (4) treatment phases. Each of the four treatment phases involved two 30-minute AAC intervention sessions designed to target a distinct language act. The setting, location, time of services, equipment, materials, and clinicians remained consistent to facilitate reliable data collection. Repeated measurements were performed throughout the investigation in order to ascertain a clear pattern of pre-professional, as well as client data for the duration of the study (please see Table 1 for a summary of the research design).

Table 1: Summary of the Research Design

Phases	Group 1 (On-Site)	Group 2 (Telepractice)
Phase 1	Baseline *Client Pre-screen administered (1x30min)*	Baseline *Client Pre-screen administered (1x30min)*
Phase 2	On-Site Intervention *Goal 1 addressed (2x30min)*	Telepractice Intervention *Goal 1 addressed (2x30min)*
Phase 3	On-Site Intervention *Goal 2 addressed (2x30min)*	Telepractice Intervention *Goal 2 addressed (2x30min)*
Phase 4	On-Site Intervention *Goal 3 addressed (2x30min)*	Telepractice Intervention *Goal 3 addressed (2x30min)*
Phase 5	On-Site Intervention *Goal 4 addressed (2x30min)*	Telepractice Intervention *Goal 4 addressed (2x30min)*
Phase 6	Baseline *Client Post-screen administered (1x30min)*	Baseline *Client Post-screen administered (1x30min)*

Research Variables

Independent Variables

For the purposes of this investigation there were two independent variables (IVs): 1) the verbal prompting provided by the supervising clinician via Active Consultation to the pre-professional clinician regarding how to model specific target phrases on the client's respective AAC device; and 2) the method of service delivery (on-site or via telepractice). Both the target phrases and the method of services delivery were manipulated to determine the effect the independent variables had on pre-professional clinician and client device productions.

Dependent Variables

Three dependent variables (DVs) were measured during the investigation: 1) the number of targets prompted by the supervising clinician via Active Consultation; 2) the number of unprompted versus prompted targets modeled by the pre-professional clinician to the client; and 3) the number of unprompted versus prompted targets produced by the client using his or her device. Data was gathered regarding the number of unprompted

versus prompted phrases generated on respective AAC devices by both the pre-professional clinician and the client.

Validity and Reliability Measures

The internal validity of this investigation was measured by performing comparisons of the treatment effect (i.e., the number of unprompted versus prompted target productions) for each pre-professional clinician and client (Horner, et al., 2005). External validity was measured by demonstrating the effect of Active Consultation across the four (4) pre-professional clinician and client cohorts (Horner, et. al., 2005). Social validity was determined by administering surveys to the pre-professional clinicians to determine their opinions and perspectives as recipients of Active Consultation.

Reliability was calculated through inter-observer agreement on frequency count measures of target phrases documented by independent Master's level SLP graduate students who coded intervention sessions in-person, and by reviewing session recordings. Language samples were generated for the pre-professional clinician, as well as the individual client for all intervention sessions. Percent agreements regarding unprompted versus prompted target phrases were calculated for 20% of the sessions (a standard set by Fey, Cleave, Long, & Hughes, 1993). The point-by-point inter-observer agreement was calculated by dividing the number of agreements by the total number of possible agreements and multiplying by 100.

Treatment integrity was established by training both the supervising clinicians and the coders. The supervising clinicians received training regarding Active Consultation, how to verbally prompt the pre-professional clinicians to physically produce target

phrases on an AAC device, as well as what target phrases to prompt for. The coders received training regarding the operational definitions of the specific communication acts (i.e., target vocabulary and phrases) being addressed in each of the intervention phases of the investigation and how to code unprompted versus prompted device productions generated by the pre-professional clinicians and the clients. Furthermore, procedural integrity of service delivery both on-site and off-site was maintained by ensuring consistency of the intervention environments (including placement of equipment as well as the type of equipment involved).

Participants, Procedures, Materials and Equipment

Four (4) clinician-client cohorts and two (2) supervising clinicians participated in the investigation. The study involved pre- and post-screen administration at the start and finish of the investigation and four weeks of intervention. Each week of the four-week intervention phase involved two 30-minute sessions per week, with two of the cohorts participating in intervention via telepractice and two of the cohorts participating in services on-site, in the same location.

Participants

Informed consent was obtained from each of the supervising clinicians, the graduate student pre-professional clinicians (PpCs), the AAC user participants (i.e., the clients), and the graduate students coding data. A total of four (4) AAC user participants, four (4) PpCs, and two (2) supervising clinicians participated in this investigation.

The AAC users, hence, the clients (n = 4) included students using Prentke Romich Company (PRC) AAC devices and were between the ages of 4.0 and 6.0 with an initial

vocabulary of at least 50 words as revealed by their device use (measured by review of their Language Acquisition Monitoring – LAM – data). In addition, participants accessed their AAC systems via direct selection and were able to participate in reciprocal activities for at least 10 minutes requiring only minimal verbal redirection, if at all. Exclusionary criteria for participation in this study for the AAC users was as follows: 1) unable to access an AAC device via direct selection; 2) diagnosed visual deficits; 3) and/or hearing loss; and 4) a history of property damage and/or self-injury. Table 2 offers a summary of each client participant's demographic information.

Table 2: Client Participant's Demographic Information

Participant	Gender	Age	Diagnosis	AAC Device & Overlay
1	M	4	Autism	Vantage Lite 60 Sequenced
2	F	4	TBI	Vantage Lite 45 Sequenced
3	M	5	Autism	Vantage Lite 60 Sequenced
4	M	6	Developmental Delay	Vantage Lite 45 Sequenced

For the pre-professional clinicians (n = 4), inclusion criteria was as follows; participants: 1) were accepted into the Speech Language Pathology Master's program at the University of Massachusetts, Amherst; 2) reported no prior or current experience providing AAC intervention, and 3) possessed normal hearing.

Supervisors included two (2) SLP clinicians (n = 2) who provided Active Consultation to the clinician-client cohorts. Inclusion criteria for the supervisors was as follows: 1) hold a Master's degree in Speech Language Pathology; 2) have a record of

current state licensing; 3) possess normal hearing; and 4) both report and demonstrate familiarity with PRC devices. The supervising clinicians reported 4-7 years working with individuals utilizing AAC.

In addition to the study participants, Master's level SLP graduate students served as coders for this investigation. Participation was strictly voluntary and informed consent was obtained for each of the Master's level SLP graduate students. Supervisors, clinicians, and coders completed a Collaborative Institutional Training Initiative (CITI) Training to ensure the protection of human subjects involved in research. Participation in this investigation was voluntary for all those involved and participants were able to withdraw from the study at any time without penalty or risk to services.

Procedures

As previously stated, this investigation involved four first-year pre-professional clinicians, two supervising clinicians, and four AAC device users providing/receiving AAC intervention on-site or via telepractice. Each PpC was paired with a client. Two of the clinician-client cohorts were assigned to the on-site condition and two to the telepractice condition, balancing device overlays (i.e., one individual with a 60 Sequenced overlay in each condition). Supervising clinicians were randomly assigned to either one of the conditions. The cohort configurations remained consistent for the duration of the investigation.

Each PpC participated in a two-hour training on the technology and procedures to be used to provide AAC intervention both on-site and off-site. They were not provided with information regarding the clients' AAC devices. Supervising clinicians participated

in a one-hour training regarding the equipment, Active Consultation procedures, phase structure, and stimuli material. Stimuli materials were given to the pre-professional clinicians at the start of each session and the PpC were overseen at all times by the supervising clinicians in both conditions and for all intervention stages of the study.

On-site intervention was conducted at the E.N. White Elementary School in Holyoke, MA (a central location for students residing in Hampden and Hampshire counties). The therapy rooms remained consistent for all on-site sessions and were equipped with a computer hosting a built-in high-definition webcam. Telepractice intervention sessions were conducted in the same location, but without the pre-professional clinician present. Instead, the pre-professional clinician provided intervention via the video conferencing software installed on the computer.

Prior to the onset of the intervention phase baseline data was gathered for each client participant to determine the presence or absence of morphological features in their expressive output. Client participants individually engaged in a shared book-reading activity with embedded probe questions designed to elicit morphosyntactic targets. Intervention phase goals were established based on the cumulative performance of the AAC device users (i.e., morphological features and parts of speech that were absent in each client's expressive output). Five distinct communication acts (generation of subject + verb phrases, plurals, negatives, past tense verbs and prepositions) served as session targets for each week of the four-week intervention phase. In order to accommodate individual clinician and client schedules, one clinician-client team from each cohort initiated intervention during week 1 of the investigation and one team started in week 2. All team participants completed 4 weeks of intervention.

A distinct communication act served as the goal each week (i.e., stage) of the intervention condition. Each cohort completed two sessions per week, whether conducted on-site or via telepractice. Data was gathered regarding the target phrases prompted by the supervising clinician, the target phrases modeled by the PpC, and the target phrases produced by the AAC user (see Table 3 for details). Each session was considered an individual session, with just one AAC device user involved for the 30-minute block. Intervention sessions occurred twice a week for four weeks, totaling 8 intervention sessions. For each week of the investigation a new target phrase (communication act) was addressed, thus amounting to four (4) distinct communication acts addressed twice a week for four weeks. Client pre- and post-screens were administered at the start and finish of the investigation to measure the overall progress of each cohort. The entire investigation was completed in 10 sessions over the course of 5 weeks.

Table 3: Description of Data Gathered for Each Participant

	Participants		
	Supervising Clinician	Pre-Professional Clinician	Client
Data Gathered	Prompted Acts *	Modeled Acts	Generated Acts

* Supervising Clinician prompts changed each week of the four-week intervention phase according to the target phrase being addressed that week

Materials and Equipment

A range of off-the-shelf and customized equipment was used in the on-site and off-site conditions of this investigation (see Table 4). In general, equipment included a combination of desktop and laptop computers, iPads, built-in and external webcams,

cellular phones and a proprietary webcam mount (the Adjustable J-Mount©; Hall & Larivee, 2012) for optimal virtual device viewing. More specifically, two 22-inch Lenovo Touchscreen desktops with built-in speakers, HD webcam, and microphone were used in both conditions to present intervention materials to the client (via the Internet using an Ethernet cable). The Lenovo computers ran a Microsoft Windows 7 operating system and had a 3.1GHz processor with 4GB memory. The 22-inch screen was large enough to display both the intervention material and the videoconferencing session (for the telepractice condition).

The clinicians providing services via telepractice used an eMachine desktop computer for video conferencing, and a Toshiba laptop for screen-sharing that was connected to the Adjustable J-Mount© to display the clinicians modeled phrases. The eMachine ran with a Microsoft Windows 7 operating system and had a 3.1GHz processor and 3GB memory. The Toshiba ran using a Microsoft Windows XP operating system, with a 2.66 GHz processor and 2GB memory. Mounted on top of the eMachine was an external Microsoft Lifecam (with an auto-focus lens, 720p HD video with 30 frames per second). For all conditions a second Logitech webcam was affixed to the Adjustable J-Mount© to offer optimal viewing of the client's use of his or her device. The Logitech webcam contained an auto-focus lens and captured 720p HD video with 30 frames per second. The Adjustable J-Mount© Logitech camera was connected to an HP TouchSmart tx2, which ran with a Microsoft Vista™ operating system and had a 2.20 GHz processor with 4GB memory. All computers were connected to the Internet via high-speed Ethernet cables. The supervising clinicians connected remotely via WiFi.

The Adjustable J-Mount© (Hall & Larivee, 2012) was designed and developed to support synchronous (and asynchronous) telepractice and tele-AAC services. This proprietary equipment offered a varied base system that was secured to either a table, a mounting system (i.e., a rolling mount), or to the standard mounting plates on the back of AAC devices. The carefully constructed flexible arm allowed the mounted webcam to capture a clear image of the AAC system screen (something that is challenging with built-in or even external webcam options), and therefore display modeled and generated phrases in real time via the Internet (see Appendix H for additional information).

Table 4: Equipment Use and Specifications

Equipment	Specifications	Location, Condition & Use
	eMachine Desktop Computer – *Microsoft Windows 7 operating system* – *3.1GHz processor* – *3GB memory*	Clinician Location: – *Telepractice Condition* – *Videoconferencing (clinician to client)*
	TouchSmart tx2 – *Microsoft Vista™ operating system* – *2.20 GHz processor* – *4GB memory*	Client location: – *Both Conditions* – *Videoconferencing (client's device use: J-Mount view)*
	Toshiba Laptop – *Microsoft Windows XP operating system* – *2.66 GHz processor* – *2GB memory*	Clinician location: – *Telepractice Condition* – *Videoconferencing (clinician's device use: J-Mount view)*
	The Adjustable J-Mount© – *Varied mounting: device mount, rolling mount, table mount* – *Holding Logitech Camera*	All locations: – *Both Conditions* – *Videoconferencing (clinician device use & client device use: J-Mount view)*
	Logitech Webcam – *auto-focus lens* – *720p HD video* – *30 fps*	All locations: – *Both Conditions* – *Videoconferencing (clinician device use & client device use: J-Mount view)*
	The Microsoft webcam – *auto-focus lens* – *720p HD video* – *30 fps*	Clinician location: – *Telepractice Condition* – *Videoconferencing (clinician's face)*
	iPad2 – *16GB memory* – *GoToMeeting app*	All locations: – *Both Conditions* – *Active Consultation* – *To view session*
	Standard Cellular Phone – *Verizon Wireless Network* – *Bluetooth™ earpiece*	All locations: – *Both Conditions* – *Active Consultation* – *To provide audio*

All intervention sessions were recorded using the embedded audio recording feature of the GoToMeeting web-based software used for telepractice, and CamStudio (a free desktop capture software). The words and phrases generated on the clients' devices and the pre-professionals' devices were recorded as text files using the built-in features within the Prentke Romich devices (LAM – Language Acquisition Monitoring).

For the purposes of Active Consultation each pre-professional clinician was fitted with a cellular telephone and paired Bluetooth™ earpiece. The supervising clinicians used cellular telephones to provide Active Consultation directly to the pre-professional clinician during each of the intervention sessions. Apple (iPhone), Droid, and Motorola cellular phones were used over a Verizon Wireless network. All Active Consultation telephone calls were free of charge as they qualified as free Verizon-to-Verizon calling.

All materials utilized during each intervention session were electronic and were presented on the Lenovo desktop monitors. Materials were accessed through Big Universe, a fee-for-service, Internet-based resource hosting mainstream and customized books (see Figure 1 for a screenshot of one of the books used to address and elicit target phrases). Telepractice was conducted using GoToMeeting, which offers HIPAA compliant videoconferencing and screen-sharing options for virtual meetings. GoToMeeting is a fee-for-service, Internet-based tool that allows the clinician and the client to interact through a shared screen (when mouse control is offered to all participants). Even though pre-professional clinicians in the on-site condition were interacting with the client in person, all materials were presented using screen-sharing of Big Universe content to ensure that the supervising clinician could view all aspects of the session remotely. See Figure 2 for varying client, clinician and supervisor viewpoints.

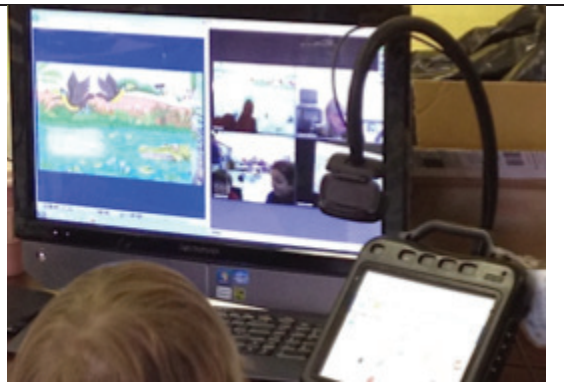
Figure 1: Example of Intervention Materials

Paws, claws, hands and feet by Kimberly Hutmacher displayed on Big Universe.com

Book presented online via Big Universe and shared through GoToMeeitng

Figure 2: Varying Participant Views of Intervention Sessions

On-site: Client & Clinician View



Telepractice: Client/Clinician View

On-site: Supervising Clinician View

Telepractice: Supervising Clinician View

Human Protection

This proposal was submitted for approval to the UMass Amherst School of Public Health and Health Sciences Human Subjects Review Committee (UMass SPHHS HSRC). This study was approved by the Committee UMass SPHHS HSRC (see Appendix C).

Statistical Analyses

This study assessed the impact of Active Consultation on the number of unprompted and prompted target phrases produced by PpCs and the AAC device users receiving intervention. In addition, AAC intervention outcomes were evaluated for the on-site conditions and compared to the outcomes of sessions offered via telepractice. Internet-based, shared reading activities with embedded probes were used to facilitate data collection and measure change of performance during each 30-minute session. This repeated data collection procedure assessed changes in target behavior, and the ultimate impact of the independent variables.

Given the single-subject research design and small sample size of this investigation, visual inspection and nonparametric analyses (see Tables 5-7 and Figure 3 for details) were used to examine the data gathered and to evaluate the differences within and between session phases and treatment conditions. Systematic visual inspection techniques were utilized to examine changes in participant performance over time (Horner et al., 2005; Kazdin, 2011; Ottenbacher, 1986), and were employed to assess changes and differences in clinician and client participant performance in this investigation.

More specifically, changes within stages amid unprompted and prompted targets generated by the PpCs and clients across sessions were examined through nonparametric descriptive measures appropriate for the data set (i.e., Median and Interquartile Range). In order to further examine the changes from Session 1 to Session 2 in each participant's production of unprompted and prompted targets, percentage change was calculated (see Table 5 for the corresponding algorithm). In addition, the Fisher Exact Test was calculated to determine whether or not a statistically significant difference existed between the types of phrases produced by each participant across sessions. Fischer's Exact Test is more accurate than similar tests when the sample size and expected numbers are small (McDonald, 2009), and offers a determination of any differences between groups (Preacher & Briggs, 2001). The Phi Coefficient (Φ) was used to measure effect size.

Table 5: Algorithms for Percent Change

Percent Change Algorithm		
Stage	Variables	Percent Change Algorithm
Session 1 Value	x	Session1 to Session 2
Session 2 Value	y	$\frac{y - x}{x} \times 100$

Figure 3: Fisher Exact Test Algorithm

$$p = \frac{\binom{A+C}{A}\binom{B+D}{B}}{\binom{N}{A+B}} = \frac{(A+B)!(C+D)!(A+C)!(B+D)!}{A!\,B!\,C!\,D!\,N!}$$

Image retrieved from Preacher & Briggs, 2001

The Improved Rate Difference (IRD; Parker, Vannest & Brown, 2009) was used to assess overall client participant progress through a comparison of data gathered at the start and finish of the investigation. The IRD algorithm calculates the difference between the data gathered in the baseline phase and the subsequent intervention phase. Improved data points are defined as data points that are equal to or greater than data points in the baseline condition and therefore isolate "non-overlapping" data points (see Table 6). All data was organized in Excel and Excel, SPSS, and statistical calculators (Preacher & Briggs, 2001) were used to run the above listed statistical analyses.

Table 6: Improved Rate Difference Algorithm

$\frac{\text{\# improved data points}}{\text{\# total data points}}$	=	Improved Rate

Lastly, the Mann-Whitney *U* test was used to assess any differences between on-site and telepractice service delivery. This statistic is a nonparametric calculation that is designed to evaluate the difference between two groups (Gravetter & Wallnau, 2004; see Table 7).

Table 7: Mann-Whitney *U* Test Algorithm

$$U_A = n_A n_B + \frac{n_A(n_A + 1)}{2} - \Sigma R_A$$

$$U_B = n_A n_B + \frac{n_B(n_B + 1)}{2} - \Sigma R_B$$

Image retrieved from Gravetter & Wallnau, 2004

CHAPTER III

RESULTS

The purpose of this study was threefold. It was designed to: 1) determine the impact of Active Consultation on the number of unprompted vs. prompted phrases modeled by pre-professional clinicians; 2) calculate the number of unprompted vs. prompted phrases generated by the client; and 3) determine whether or not a significant difference existed between intervention outcomes of services provided onsite vs. via telepractice. The following sections detail the results as they relate to each research question. Individual participant results are listed for the pre-professional and client participants, and is followed by a presentation of on-site and telepractice cohort data.

Individual Participant Results

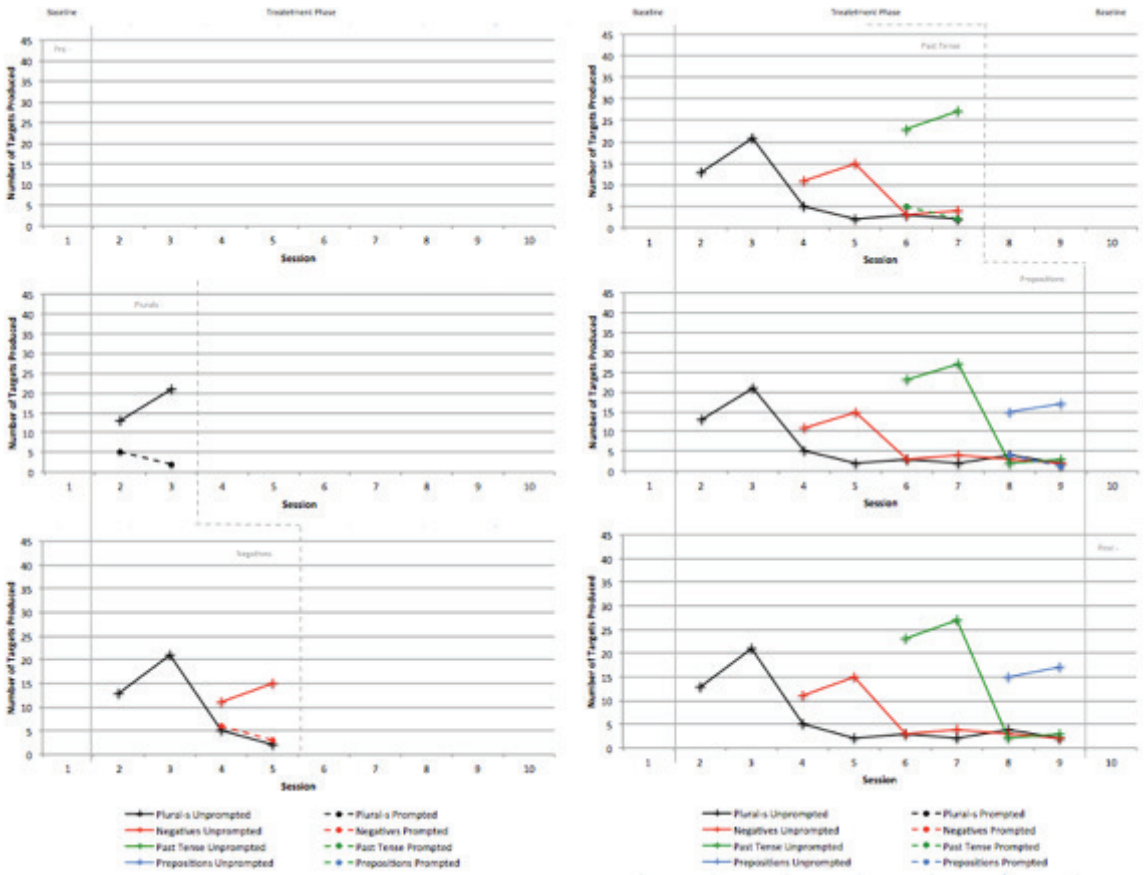
To examine each individual's response to the services provided, visual inspection and statistical analyses were conducted on the number of unprompted and prompted target phrases produced by each PpC and each client. The data for each participant are discussed below and presented in Figures 4-10 and Tables 8-17.

Research Question 1: Pre-professional Clinician Participants

With respect to Research Question 1 data revealed that there was an increase in unprompted target production across intervention stages when Active Consultation was being applied for each pre-professional clinician (PpC). Individual PpC data is detailed below:

Pre-professional Clinician 1: Pre-professional Clinician 1 (PpC1) worked with Client 1, who utilized a Prentke Romich Vantage Lite with a 45 Sequenced overlay. She conducted intervention in-person and participated in all four phases of the intervention condition (specifically weeks 2-5). Visual analysis of PpC1's data revealed that her modeled productions of targets increased from Session 1 to 2 within a given intervention stage for all four of the stages of the intervention phase (see Figure 4 and Table 8). The sections that follow detail specific data regarding unprompted (independent) and prompted phrases modeled by PpC1 for each stage of the intervention condition.

Figure 4: Multiple Baseline Graph for Pre-professional Clinician 1



Intervention Stage 1 – Plurals: Calculations indicated that PpC1 independently generated 13 plural targets during Session 1 and 21 plural targets during Session 2 (*Mdn* = 17, IQR = 8), with a 61.5% increase in independent target production from Session 1 to 2. The number of targets produced with supervisory guidance decreased from Session 1 to 2. PpC1 produced 5 prompted plural targets during Session 1 and 2 prompted plural targets during Session 2 (*Mdn* = 3.5, IQR = 3), with a 60% decrease across sessions. A comparison of unprompted and prompted plurals generated across sessions was not statistically significant, as measured by the Fisher Exact Test ($p = .21$), and the effect size of the difference was small to medium ($\Phi = .25$).

Intervention Stage 2 – Negatives: This stage of the intervention condition focused on the generation of negatives. PpC1 generated 11 targets during Session 1 and 15 targets during Session 2 (*Mdn* = 13, IQR = 6) without prompting; a 36.4 % increase across sessions. With prompting, PpC1 modeled 6 negative targets during Session 1 and 3 negative targets during Session 2 (*Mdn* = 4.5, IQR = 3), yielding a 50% decrease. The difference in unprompted and prompted productions across sessions was not statistically significant ($p = .26$), and the effect size was small to medium ($\Phi = .21$).

Intervention Stage 3 – Past Tense: PpC1 independently generated and modeled 23 past tense targets during Session 1 and 27 past tense targets during Session 2 (*Mdn* = 25, IQR = 4). This change yielded a 17.4% increase in independent productions from Session 1 to Session 2. With prompting, PpC1 generated 5 past tense targets during Session 1 and 2 past tense targets during Session 2 (*M* = 3.5, IQR = 3), with a decrease in number of 60%. The difference between the clinician's unprompted and prompted past tense productions across sessions was not statistically significant. A calculation of the Fisher

Exact Test yielded a *p* value of .25, and a small effect size ($\Phi = .17$).

Intervention Stage 4 – Prepositions: The last stage of the intervention condition for PpC1 addressed the use of prepositions. PpC1 independently generated 15 prepositions during Session 1 and 17 prepositions during Session 2 (*Mdn* = 16, IQR = 2), with a 13.3% increase in the number of targets produced. With respect to prompted productions, PpC1 generated 4 prompted prepositions during Session 1 and 1 preposition during Session 2 (*Mdn* = 2.5, IQR = 3). This change between sessions resulted in a 75% decrease in prompted productions. The difference between unprompted and prompted productions across sessions was not statistically significant, $p = .34$, and the effect size was small ($\Phi = .18$).

Table 8: Descriptive and Statistical Data for Pre-professional Clinician 1

Data	Plurals		Negatives		Past Tense		Prepositions	
	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted
Session 1 #	13	5	11	6	23	5	15	4
Session 2 #	21	2	15	3	27	2	17	1
Median (*Mdn*)	17	3.5	13	4.5	25	3.5	16	2.5
Interquartile Range (IQR)	8	3	6	3	4	3	2	3
Percentage Change (%)	+61.5	-60	+36.4	-50	+17.4	+60	+13.3	-75
Fisher's Exact Test (*p*)	.21		.26		.25		.34	
Phi Coefficient (Φ)	.25		.21		.17		.18	

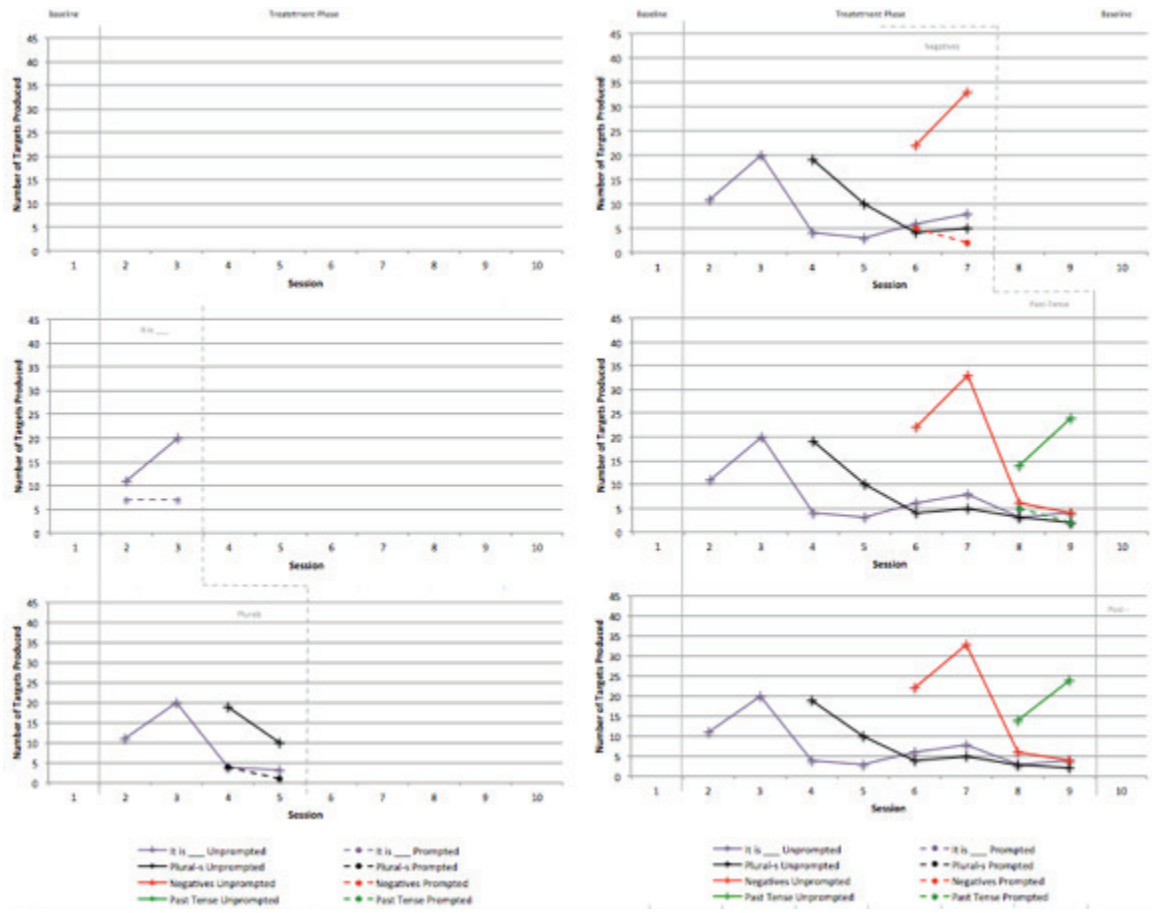
+ Percent Change represents a positive change across sessions; - Percent Change represents a negative change across sessions
Phi Coefficient (Φ) of 0.10 = small effect size; 0.30 = medium effect size; and 0.50 = large effect size

In summary, a comparison of the medians for unprompted versus prompted targets revealed a consistently greater number of unprompted (independent) target productions when compared to prompted targets for each stage. The range of unprompted productions was 11-27, whereas the range of prompted productions was 1-6. Analysis of the data gathered indicated positive increases from Session 1 to Session 2 in the number of unprompted targets produced across all stages, with IQR data ranging from 2-8. This

was contrasted by percentage decreases in the number of prompted phrases generated for all stages of the intervention condition (IQR data was 3 for all four stages).

Pre-professional Clinician 2: PpC2 worked with Client 2, who utilized a Prentke Romich Vantage Lite with a 60 Sequenced overlay. She conducted intervention on-site, and participated in all phases of the investigation (specifically weeks 1-4). For three of the four stages of the intervention phase the PpC2's modeled productions increased from Session 1 to 2 within a given intervention phase (see Figure 5). Stage-specific data regarding unprompted and prompted phrases modeled by the PpC2 are presented below.

Figure 5: Multiple Baseline Graph for Pre-professional Clinician 2



Intervention Stage 1 – Subject-Verb Phrases ("It is ___"): Calculations indicated that PpC2 independently generated 11 S+V targets during Session 1 and 20 S+V targets during Session 2 (*Mdn* = 15.5, IQR = 6.36), with an 81.8% increase from Session 1 to 2. The number of prompted targets produced was the same for both sessions. PpC2 produced 7 prompted S+V targets during Session 1 and 7 prompted S+V targets during Session 2 (*Mdn* = 7, IQR = 0), resulting in 0% difference across sessions. There was not a statistically significant difference between unprompted and prompted phrase productions across sessions ($p = .51$), and the effect size was small ($\Phi = .14$).

Intervention Stage 2 – Plurals: During this stage of the intervention condition PpC2 generated 19 plural targets during Session 1 and 10 plural targets during Session 2 (*Mdn* = 14.5, IQR = 9) without prompting, resulting in a 47.4% decrease across sessions. With prompting PpC2 modeled 4 plural targets during Session 1 and 1 plural target during Session 2 (*Mdn* = 2.5, IQR = 3), with a 75% decrease from one session to the next. The Fisher's Exact Test resulted in a *p* value of 1.0, indicating no statistically significant difference between the unprompted and prompted phrases generated across sessions, and there was a small effect size ($\Phi = .11$).

Intervention Stage 3 – Negatives: PpC2 independently modeled 22 and 33 negative targets (*Mdn* = 27.5, IQR = 11) during Sessions 1 and 2. This resulted in a 50% increase in independent productions from Session 1 to Session 2. With prompting, PpC2 generated 5 negative targets during Session 1 and 2 negative targets during Session 2 (*Mdn* = 3.5, IQR= 3), with a decrease in number of 60%. The difference in unprompted and prompted targets generated across sessions was not statistically significant ($p = .22$), and the effect size was small to medium ($\Phi = .2$).

Intervention Stage 4 – Past Tense: During the last stage of the intervention condition, PpC2's unprompted (independent) productions increased. PpC2 independently generated 14 past tense targets during Session 1 and 24 past tense targets during Session 2 (*Mdn* = 19, IQR = 10), with a 71.4% increase in the number of targets produced from session to session. Her prompted productions decreased across sessions. PpC2 produced 5 past tense targets with prompting during Session 1, and 2 past tense targets during Session 2 (*Mdn* = 3.5, IQR = 3), resulting in a 60% decrease in prompted target productions from Session 1 to Session 2. The Fisher Exact Test was calculated as $p = .11$, and therefore there was no statistically significant difference between the numbers of unprompted and prompted targets produced from Session 1 to Session 2. Computation of the Phi Coefficient yielded a small to medium effect size ($\Phi = .25$).

Table 9: Descriptive and Statistical Data for Pre-professional Clinician 2

Data	S + V		Plurals		Negatives		Past Tense	
	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted
Session 1 #	11	7	19	4	22	5	14	5
Session 2 #	20	7	10	1	33	2	24	2
Median (*Mdn*)	15.5	7	14.5	2.5	27.5	3.5	19	3.5
Interquartile Range (IQR)	9	0	9	3	11	3	10	3
Percentage Change (%)	+81.8	0	**-47.4**	-75	+50	-60	+71.4	-60
Fisher's Exact Test (p)	.51		1.0		.22		.11	
Phi Coefficient (Φ)	.14		.11		.2		.25	

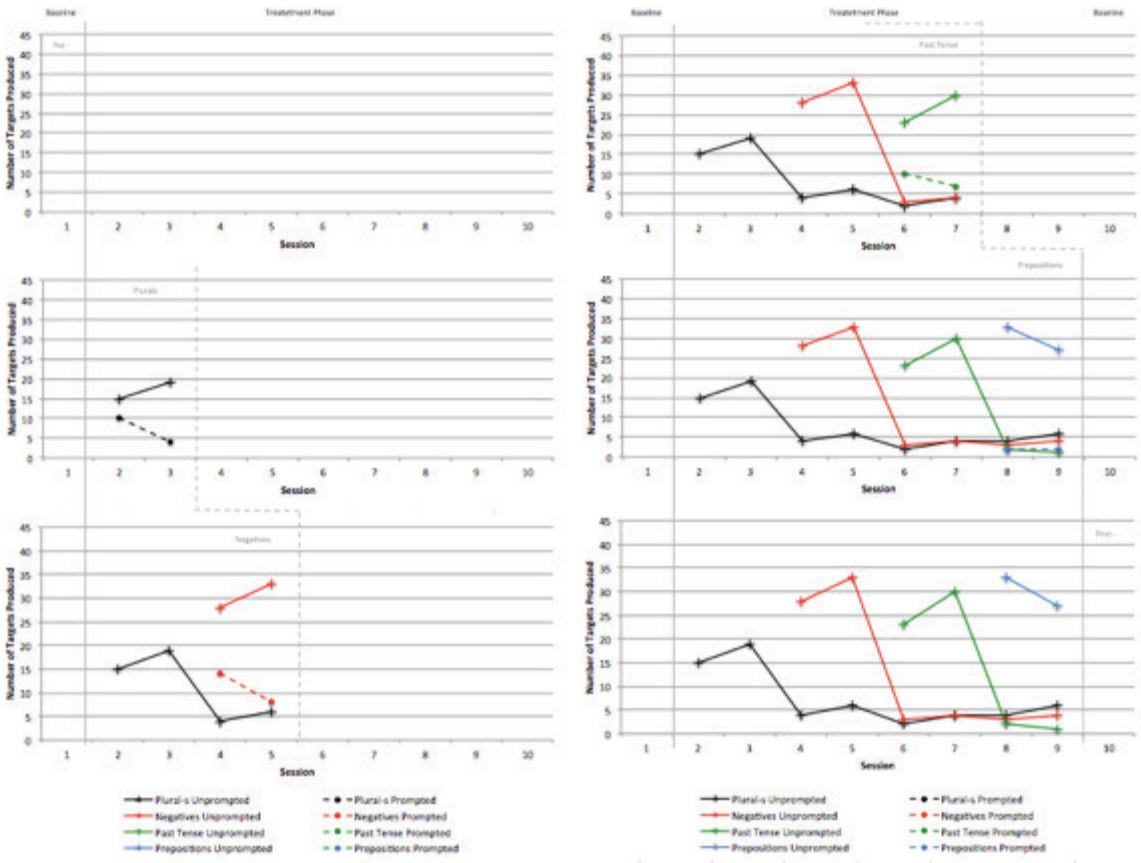
+ Percent Change represents a positive change across sessions; - Percent Change represents a negative change across sessions
Phi Coefficient (Φ) of 0.10 = small effect size; 0.30 = medium effect size; and 0.50 = large effect size

A review of the PpC2's data revealed production of a greater number of unprompted targets compared to prompted targets for each stage. More specifically, PpC2's unprompted productions ranged from 11-22, and her prompted productions ranged from 4-7. Data gathered indicated positive increases in the percentage of unprompted targets produced from Session 1 to 2 for 3 of the 4 stages (IQR data ranging

from 9-11). In contrast, percentage decreases of prompted phrases from Session 1 to 2 were noted for all but the first stage of the intervention condition (a 0-3 IQR data span).

Pre-professional Participant 3: PpC3 worked with Client 3, who utilized a Prentke Romich Vantage Lite with a 60 Sequenced overlay. She conducted intervention via telepractice, and participated in all stages of the intervention condition. The data revealed that for three of the four stages of the intervention phase PpC3's modeled productions of targets increased from Session 1 to 2 within a given intervention phase (see Figure 6 and Table 10). More specific calculations and data are presented below.

Figure 6: Multiple Baseline Graph for Pre-professional Clinician 3



Intervention Stage 1 – Plurals: Calculations indicated that PpC3 independently generated 15 plural targets during Session 1 and 19 plural targets during Session 2 (*Mdn* = 17, IQR = 4), with a 26.7% increase in number from Session 1 to 2. The number of targets produced with supervisory guidance decreased from Session 1 to Session 2. PpC3 produced 10 prompted plural targets during Session 1 and 4 prompted plural targets during Session 2 (*Mdn* = 7, IQR = 6), with a 60% decrease. The difference between the number of unprompted and prompted phrases modeled across sessions was not statistically significant ($p = .12$), and the effect size was small to medium ($\Phi = .25$).

Intervention Stage 2 – Negatives: During this stage of the intervention condition PpC3 independently generated 28 negative targets during Session 1 and 33 negative targets during Session 2 (*Mdn* = 30.5, IQR = 5), resulting in a 17.9% increase. With prompting, PpC3 modeled 14 negative targets during Session 1 and 8 negative targets during Session 2 (*Mdn* = 11, IQR = 6), with a 42.7% decrease. The Fisher Exact Test was calculated to be $p = .21$, and the Phi Coefficient yielded a small effect size ($\Phi = .16$).

Intervention Stage 3 – Past Tense: PpC3 independently modeled 23 and 30 past tense targets (*Mdn* = 26.5, IQR = 7) during Sessions 1 and 2 of this stage of the intervention phase of the investigation. This yielded a 30.5% increase in the number of targets modeled from one session to the next. With prompting, PpC3 generated 10 past tense targets during Session 1 and 7 past tense targets during Session 2 (*Mdn* = 8.5, IQR = 3), with a decrease in number of 30%. For this stage, the difference between unprompted and prompted target production was not statistically significant ($p = .4$), and the effect size was small ($\Phi = .13$).

Intervention Stage 4 – Prepositions: During the last stage of the intervention

condition, PpC3's unprompted productions decreased. She independently generated 33 prepositions during Session 1 and 27 prepositions during Session 2 (*Mdn* = 30, IQR = 6), with an 18.2% decrease in the number of targets produced. Her prompted productions remained consistent and she generated 2 prepositions with prompting during both Session 1 and Session 2 (*Mdn* = 2, IQR = 0), resulting in a 0% difference. The Fisher Exact Test yielded a *p* value of 1.0, and there was therefore no statistically significant difference in target production across sessions. The Phi Coefficient was -.02, indicating a small effect size.

Table 10: Descriptive and Statistical Data for Pre-professional Clinician 3

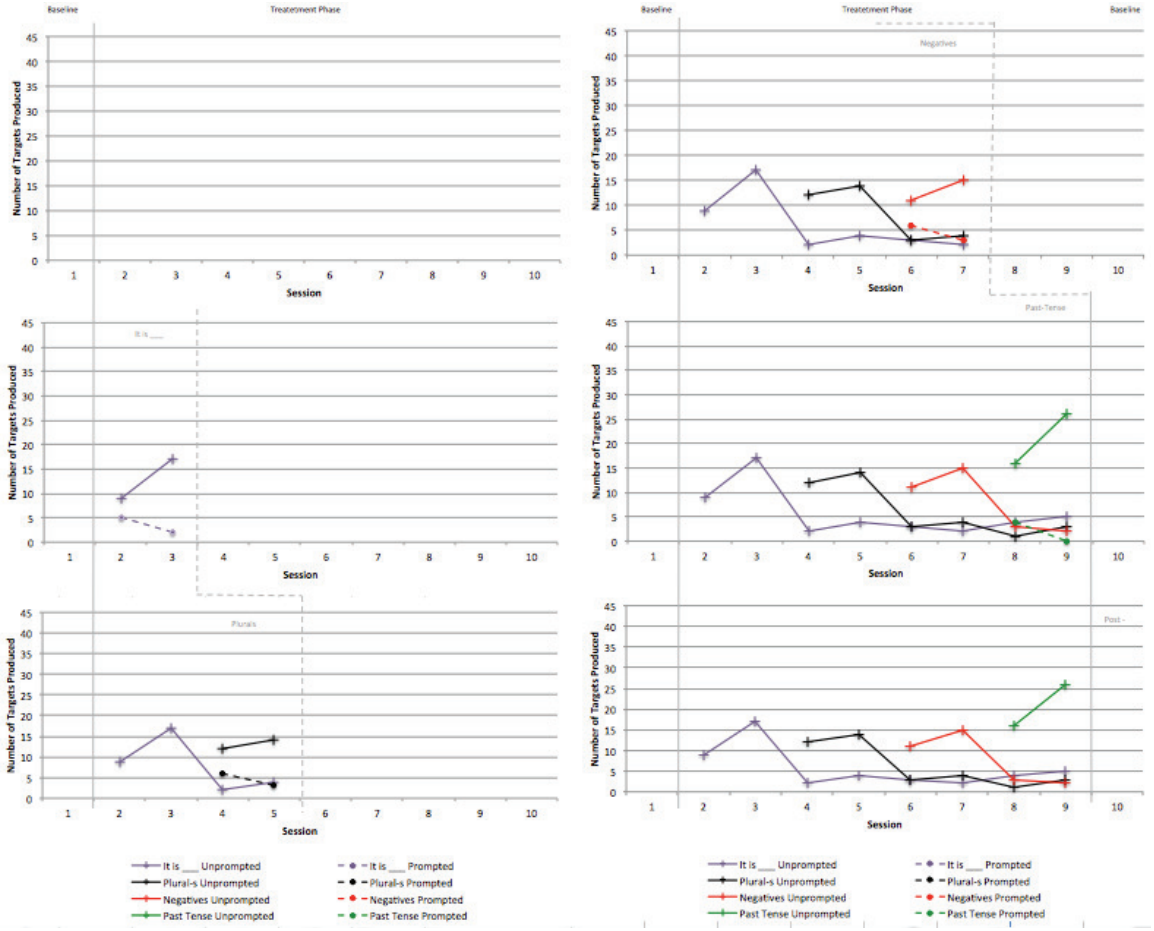
Data	Plurals		Negatives		Past Tense		Prepositions	
	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted
Session 1 #	15	10	28	14	23	10	33	2
Session 2 #	19	4	33	8	30	7	27	2
Median (*Mdn*)	17	7	30.5	11	26.5	8.5	30	2
Interquartile Range (IQR)	4	6	5	6	7	3	6	0
Percentage Change (%)	+26.7	-60	+17.9	-42.9	+30.4	-30	**-18.2**	0
Fisher's Exact Test (*p*)	.12		.21		.4		1.0	
Phi Coefficient (*Φ*)	.25		.16		.13		-.02	

+ Percent Change represents a positive change across sessions; - Percent Change represents a negative change across sessions
Phi Coefficient (*Φ*) of 0.10 = small effect size; 0.30 = medium effect size; and 0.50 = large effect size

In summary, an examination of the medians for unprompted versus prompted targets revealed consistently greater medians of unprompted (i.e., independent target production) target generation when compared to prompted targets for each stage. The number of PpC3's unprompted productions ranged from 15-33, and her prompted productions ranged from 2-14. In addition, visual inspection of the data gathered indicated positive increases from Session 1 to Session 2 in the percentage of unprompted targets produced (with IQR data ranging from 4-7) for 3 of the 4 stages. Similarly, percentage decreases of prompted phrases from Session 1 to 2 within a given stage were noted for 3 of the 4 stages of the intervention condition (IQR data ranged from 0-6).

Pre-professional Clinician 4: PpC4 worked with Client 4, who utilized a Prentke Romich Vantage Lite with a 45 Sequenced overlay. She conducted intervention via telepractice, and participated in all intervention stages of the investigation (specifically weeks 1-4). Visual inspection of her data indicated an increase from Session 1 to 2 in the modeled productions of target phrases within a given intervention phase (see Figure 7 and Table 11). More specific calculations and data regarding unprompted (independent) and prompted phrases modeled by PpC4 for each stage of the intervention condition are presented below.

Figure 7: Multiple Baseline Graph for Pre-professional Clinician 4



Intervention Stage 1 – Subject-Verb Phrases ("It is ___"): Data gathered on PpC4's production of S+V target phrases indicated that she independently generated 9 targets during Session 1 and 17 targets during Session 2 (*Mdn* = 13, IQR = 8), with an 88.9% increase from Session 1 to 2. PpC4 produced 5 prompted S+V targets during Session 1 and 2 prompted S+V targets during Session 2 (*Mdn* = 3.5, IQR = 3), resulting in 60% decrease across sessions. There was no statistically significant difference in the number of unprompted and prompted targets produced across session, as evidenced by the result of the Fisher Exact Test ($p = 1$), yet there was a medium effect size ($\Phi = .3$).

Intervention Stage 2 – Plurals: During this stage of the intervention condition PpC4 independently generated 12 plural targets during Session 1 and 14 plural targets during Session 2 (*Mdn* = 13, IQR = 2). This resulted in a 16.7% increase across sessions. With prompting PpC4 modeled 6 plural targets during Session 1 and 3 plural targets during Session 2 (*Mdn* = 4.5, IQR = 3), decreasing by 50% respectively. The difference between unprompted and prompted targets produced across sessions was not statistically significant ($p = .44$), and there was a small effect size ($\Phi = .18$).

Intervention Stage 3 – Negatives: PpC4 modeled 11 negative targets during Session 1 and 15 negative targets during Session 2 (*Mdn* = 13, IQR = 4) without prompting. This resulted in a 36.4% increase in independent models from Session 1 to Session 2. With prompting, PpC4 generated 6 negative targets during Session 1 and 3 negative targets during Session 2 (*Mdn* = 3.5, IQR = 3), with a decrease in number of 50%. During this stage of the intervention condition there was no statistically significant difference between phrase types ($p = .26$), yet there was a small to medium effect size ($\Phi = .21$).

Intervention Stage 4 – Past Tense: During the last stage of the intervention condition, PpC4's unprompted (independent) productions increased. PpC4 independently generated 16 past tense targets during Session 1 and 26 past tense targets during Session 2 (*Mdn* = 21, IQR = 10), with a 62.5% increase in the number of targets produced from session to session. Her prompted productions decreased across sessions. PpC 4 produced 5 past tense targets with prompting during Session 1, and 0 past tense targets during Session 2 (*Mdn* = 2, IQR= 4), resulting in a 100% decrease in prompted target production from Session 1 to Session 2. The Fisher Exact Test revealed a statistically significant difference between unprompted and prompted targets generated across sessions (p = .02), and there was a medium effect size (Φ = .35).

Table 11: Descriptive and Statistical Data for Pre-professional Clinician 4

Data	S + V		Plurals		Negatives		Past Tense	
	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted
Session 1 #	9	5	12	6	11	6	16	4
Session 2 #	17	2	14	3	15	3	26	0
Median (*Mdn*)	13	3.5	13	4.5	13	3.5	21	2
Interquartile Range (IQR)	8	3	2	3	4	3	10	4
Percentage Change (%)	+88.9	-60	+16.7	-50	+36.4	-50	+62.5	-100
Fisher's Exact Test (p)	.11		.44		.26		**.02**	
Phi Coefficient (Φ)	.3		.18		.21		.35	

+ Percent Change represents a positive change across sessions; - Percent Change represents a negative change across sessions
Phi Coefficient (Φ) of 0.10 = small effect size; 0.30 = medium effect size; and 0.50 = large effect size

In summary, in each of the stages, PpC4 generated a greater number of unprompted targets (ranging from 9-26) than prompted targets (ranging from 0-6). Data revealed that for each of the stages PpC4's unprompted phrases increased from Session 1 to Session 2 (IQR data ranged from 2-10) and her prompted phrase production decreased from Session 1 to Session 2 (with IQR data ranging from 3-4).

Overall, all pre-professional clinician participants demonstrated an increase in unprompted target production across intervention stages when Active Consultation was being applied. In general, the PpCs demonstrated an increase in the number of unprompted targets modeled across sessions, and a decrease in the number of prompted targets modeled from Session 1 to 2. Multiple Mann-Whitney *U* tests were calculated to determine if differences existed between the numbers of phrases generated by the group of PpCs (i.e., the PpCs in the on-site group versus the telepractice group) within each stage of the intervention condition. A comparison of PpC performance within each stage revealed no statistically significant difference between the number of unprompted and prompted targets produced in each condition (see Table 12 for details).

Table 12: Compilation of Pre-professional Clinician Data

	S + V		Plurals		Negatives		Past Tense		Prepositions	
	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted
PpC1			13-21	5-2	11-15	6-3	23-27	5-2	15-17	4-1
PpC2	11-20	7-7	**19-10**	4-1	22-33	5-2	14-24	5-2		
PpC3			15-19	10-4	28-33	14-8	23-30	10-7	**33-27**	2-2
PpC4	9-17	5-2	12-14	6-3	11-15	6-3	16-26	4-0		
U	3.0	4.0	8.5	12.5	8.5	13	9.5	10	4.0	2.0
p	.66	.33	.88	.2	.88	.2	.68	.68	.33	1.0

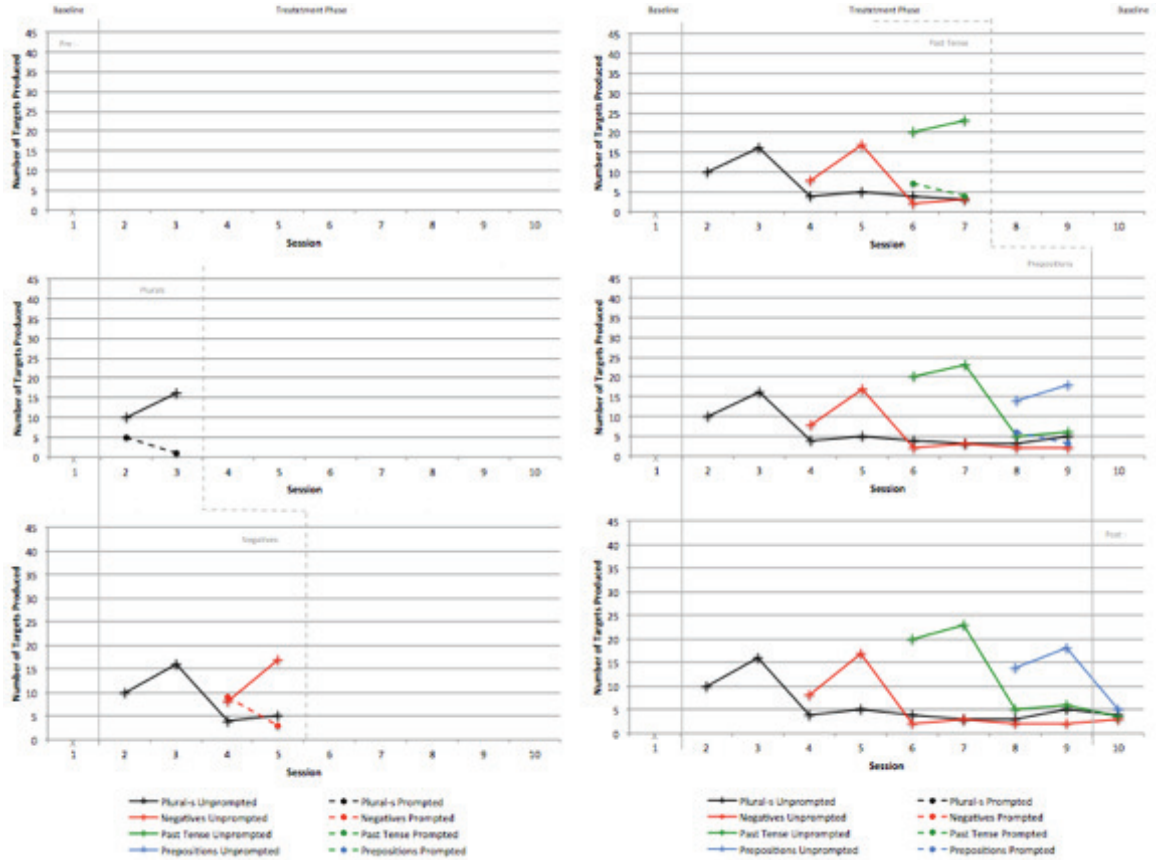
p>=0.05, two-tailed test

Research Question 2: Client Participants

With respect to the second research question data revealed that there was an increase in the clients' unprompted, independent production of target phrases across stages. Each individual client's performance was measured in order to examine the impact of Active Consultation on his or her device use. Baseline (pre-screen), intervention (for each stage), and post-screen data was gathered and is reported below:

Client Participant 1: Client 1 participated in the on-site condition, and therefore completed on-site pre- and post-screenings, and 8 sessions on-site during weeks 2-5. During the baseline phase, this participant was observed utilizing primarily singles words comprised of nouns (such as "ice cream" and "cookie"), verbs (such as "eat", "turn", and "stop"), some pronouns ("I" and "you"), and two adjectives ("happy" and "sad"). Client 1 was not observed combining words to form subject-verb phrases, nor was she observed utilizing plurals, verb tensing, or negative phrases. Visual inspection of the data revealed that for all of the stages of the intervention phase the client's independent generation of target phrases increased from Session 1 to Session 2; while her prompted productions decreased across sessions (see Figure 8 for a visual representation of the data gathered). More specific calculations and data regarding unprompted and prompted phrases generated by the client during each stage of the intervention condition are presented below.

Figure 8: Multiple Baseline Graph for Client 1



Intervention Stage 1 – Plurals: Data revealed that Client 1 independently produced 10 plural targets during Session 1 and 16 plural targets during Session 2 (*Mdn* = 13, IQR = 6), yielding an increase in the number of target productions by 60%. With respect to prompted production of plural targets, Client 1 produced 5 prompted plural targets during Session 1 and 1 prompted plural target during Session 2 (*Mdn* = 4, IQR = 4). This change in data resulted in an 80% decrease in the number of prompted plural targets generated from Session 1 to Session 2. The Fisher Exact Test revealed that there was not a statistically significant difference between the types of targets generated across sessions ($p = .07$), yet there was a medium effect size ($\Phi = .35$).

Intervention Stage 2 – Negatives: During the second stage of the intervention condition Client 1 independently produced 8 negative targets during Session 1 and 17 negative targets during Session 2 (*Mdn* = 12.5, IQR = 9). This represented a 112.5% increase in unprompted productions across sessions. With respect to prompted phrases, with support, Client 1 generated 9 negative targets during Session 1 and 3 negative targets during Session 2 (*Mdn* = 6, IQR= 6), with an increase of 66.7% from Session 1 to Session 2. There was no statistically significant difference between the types of phrases generated across sessions (p = .47), but there was a medium effect size (Φ = .4).

Intervention Stage 3 – Past Tense: Client 1 independently generated 20 past tense verbs during Session 1 and 23 past tense targets during Session 2 (*Mdn* = 21.5, IQR = 3), with an increase in number of 15% from Session 1 to Session 2. Client 1 required prompting to generate 7 past tense targets during Session 1 and 4 past tense targets during Session 2 (*Mdn* = 5.5, IQR = 3), yielding a 42.9% decrease in the number of prompted past tense targets. The difference in the number of unprompted targets generated compared to prompted targets was not statistically significant for this stage of the intervention, and was p =.5. Furthermore, there was a small effect size (Φ = .14).

Intervention Stage 4 – Prepositions: Client 1's unprompted productions increased from 14 prepositional targets to 18 targets (*Mdn* = 16, IQR = 4) from Session 1 to 2. This resulted in a 28.6% increase in the number of targets produced. Client 1's prompted productions decreased across sessions. With assistance Client 1 generated 6 prepositions during Session 1 and 3 prepositions during Session 2 (*Mdn* = 4.5, IQR = 3); a 50% decrease. The difference in phrase types across sessions was not statistically significant (p = .27), and there was a small effect size (Φ = .19).

Table 13: Descriptive and Statistical Data for Client 1

Data	Plurals		Negatives		Past Tense		Prepositions	
	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted
Session 1 #	10	5	8	9	20	7	14	6
Session 2 #	16	1	17	3	23	4	18	3
Median (*Mdn*)	13	4	12.5	6	21.5	5.5	16	4.5
Interquartile Range (IQR)	6	4	9	6	3	3	4	3
Percentage Change (%)	+60	-80	+112.5	-66.7	+15	42.9	+28.6	-50
Fisher's Exact Test (*p*)	.07		.47		.5		.27	
Phi Coefficient (Φ)	.35		.4		.14		.19	

+ Percent Change represents a positive change across sessions; - Percent Change represents a negative change across sessions
Phi Coefficient (Φ) of 0.10 = small effect size; 0.30 = medium effect size; and 0.50 = large effect size

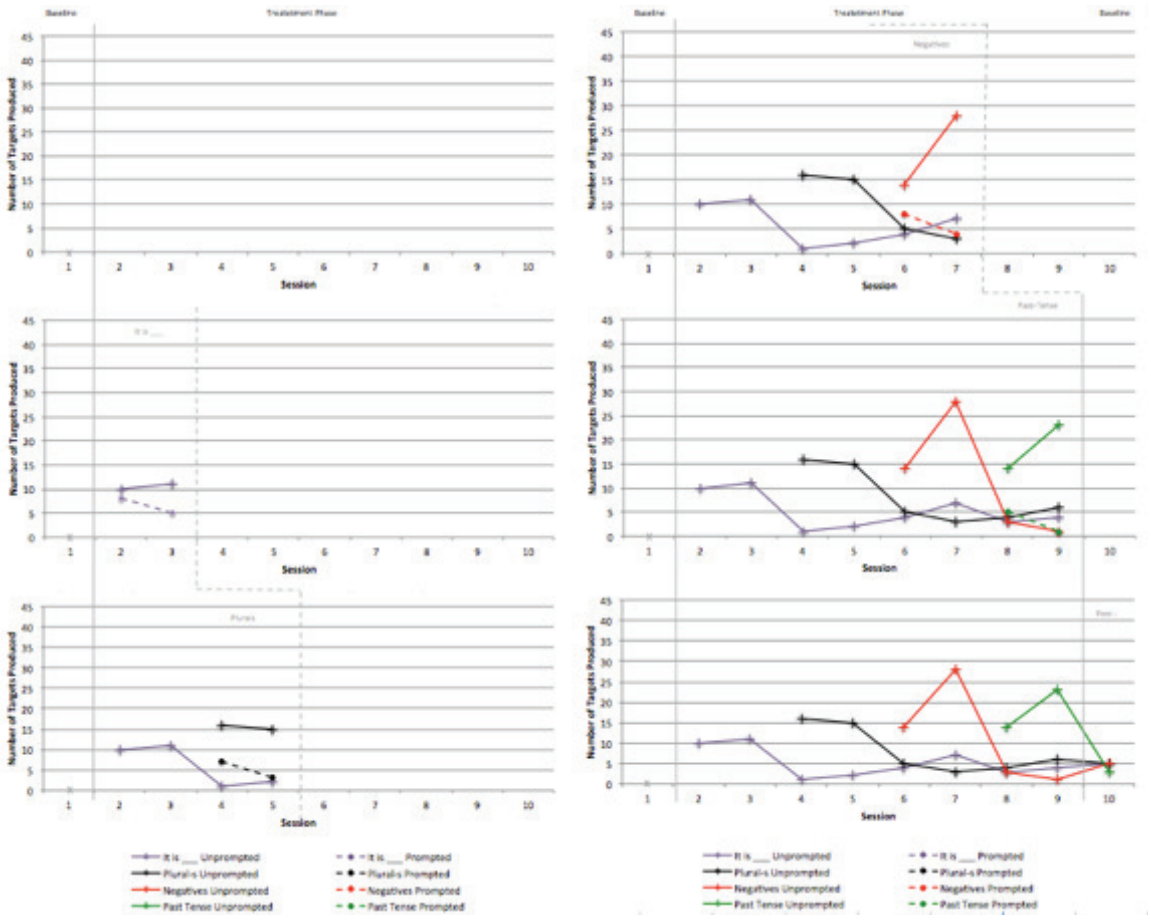
Pre- and Post-screen Comparison: The Improved Rate Difference (IRD) was calculated to compare the client's unprompted (independent) generation of target phrases during the pre-screen (baseline), intervention phase, and post-screen (baseline) conditions of the investigation. A comparison of pre-screen and intervention data points revealed that for 100% of intervention sessions the client generated more independent target phrases than was noted during the pre-screen condition. A comparison of pre-screen (baseline) and post-screen (baseline) data yielded an IRD of 100%, indicating that for each target, the client generated a greater number of unprompted phrases during the post-screen phase than when compared to the pre-screen condition. In addition, a comparison of independent productions one session after the target was addressed revealed that in 100% of instances the client generated more independent target utterances than was noted in the pre-screen baseline phase.

Overall, data revealed consistently greater medians for unprompted (independent) target production when compared to prompted targets for each stage. Client 1's independent productions ranged from 10-27 targets, whereas her prompted productions ranged from 1-6. Visual inspection of the data gathered indicated positive increases in the number of unprompted phrases and negative decreases in the number of prompted

phrases from Session 1 to Session 2 for all 4 stages of the intervention condition. The IQR data for unprompted phrases ranged from 3-9, and was 3-6 for prompted phrases.

Client Participant 2: Client 2 participated in the on-site condition. He completed on-site pre- and post-screenings, and 8 sessions (during weeks 1-4) in-person. During the baseline phase, this participant used single nouns and verbs. He did not produce novel subject-verb phrases, prepositions, negatives, or past tense verb forms. The data gathered revealed increases in unprompted target generation in 3 of the 4 stages and decreases in prompted target production for all 4 stages (see Figure 9). Specific data are below.

Figure 9: Multiple Baseline Graph for Client 2



Intervention Stage 1 – Subject-Verb Phrases ("It is ___"): Data gathered on production of S+V target phrases indicated that Client 2 independently generated 10 targets during Session 1 and 11 targets during Session 2 (*Mdn* = 10.5, IQR = 1), with a 10% increase from Session 1 to 2. With respect to prompted targets, Client 2 produced 8 prompted S+V targets during Session 1 and 5 prompted S+V targets during Session 2 (*Mdn* = 6.5, IQR = 3), resulting in a 37.5% decrease across sessions. The difference between unprompted and prompted target phrases produced across sessions was not statistically significant ($p = .49$), and the effect size was small ($\Phi = .14$).

Intervention Stage 2 – Plurals: Data revealed that Client 2 independently produced 16 plural targets during Session 1 and 15 plural targets during Session 2 (*Mdn* = 15.5, IQR = 1), yielding a 6.3% decrease in the number of target productions. Client 2 produced 7 prompted plural targets during Session 1 and 3 prompted plural targets during Session 2 (*Mdn* = 5, IQR = 4). This resulted in a 57.1% decrease in the number of prompted plural targets generated from Session 1 to Session 2. The Fisher Exact Test result was $p = .46$, and there was therefore no statistically significant difference between unprompted and prompted target production across sessions. The Phi Coefficient yielded a small effect size ($\Phi = .16$).

Intervention Stage 3 – Negatives: During the third stage of the intervention condition Client 2 produced 14 negative targets during Session 1 and 28 negative targets during Session 2 (*Mdn* = 21, IQR= 14) without clinician prompting. This represented a 100% increase in independent productions from Session 1 to Session 2. With respect to prompted phrases, Client 2 generated 8 negative targets during Session 1 and 4 negative targets during Session 2 (*Mdn* = 6, IQR = 4), with a decrease of 50% from Session 1 to

Session 2. Computation of The Fisher Exact Test was $p = .05$, and there was therefore a statistically significant difference between the number of unprompted and prompted targets generated during this stage of the investigation. In addition, there was a small to medium effect size ($\Phi = .28$).

Intervention Stage 4 – Past Tense: Client 2 independently generated 14 past tense verbs during Session 1 and 23 past tense targets during Session 2 (*Mdn* = 18.5, IQR = 9), with an increase of 64.28% from Session 1 to Session 2. Client 2 required prompting to generate 5 past tense targets during Session 1 and 1 past tense target during Session 2 (*Mdn* = 3, IQR = 4), yielding an 80% decrease in the number of prompted past tense targets. The difference between the unprompted and prompted targets generated by the client during this stage was not statistically significant and was $p = .07$, yet there was a medium effect size ($\Phi = .32$).

Table 14: Descriptive and Statistical Data for Client 2

Data	S + V		Plurals		Negatives		Pat Tense	
	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted
Session 1 #	10	8	16	7	14	8	14	5
Session 2 #	11	5	15	3	28	4	23	1
Median (*Mdn*)	10.5	6.5	15.5	5	21	6	18.5	3
Interquartile Range (IQR)	1	3	1	4	14	4	9	4
Percentage Change (%)	+10	-37.5	**-6.3**	-57.1	+100	-50	+64.3	-80
Fisher's Exact Test (p)	.49		.46		**.05**		.07	
Phi Coefficient (Φ)	.14		.16		.28		.32	

+ Percent Change represents a positive change across sessions; - Percent Change represents a negative change across sessions
Phi Coefficient (Φ) of 0.10 = small effect size; 0.30 = medium effect size; and 0.50 = large effect size

Pre- and Post-screen Comparison: The Improved Rate Difference (IRD) was calculated to compare the client's unprompted target generation during the pre-screen (baseline), intervention phase, and post-screen (baseline) conditions of the investigation. A comparison of pre-screen and intervention data points revealed that for 100% of

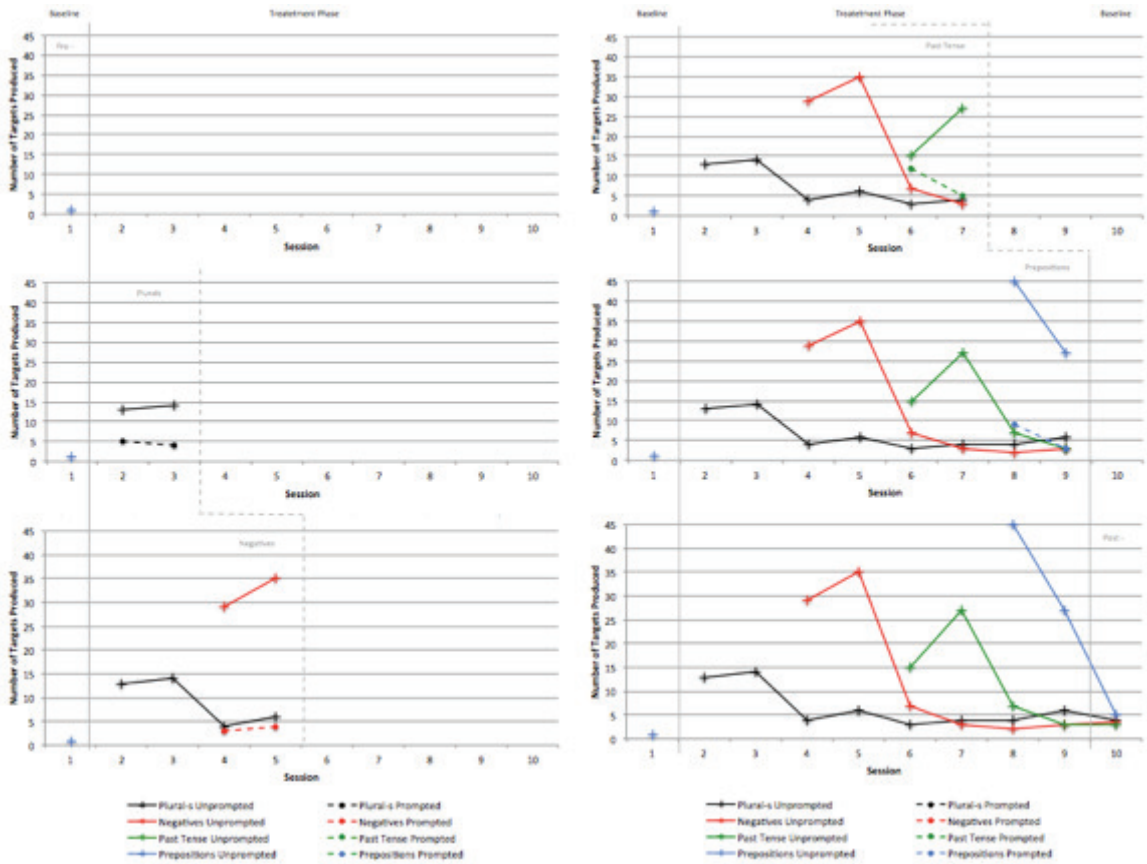
intervention sessions the client generated more independent target phrases than was noted during the pre-screen, baseline condition. A comparison of pre-screen (baseline) and post-screen (baseline) data yielded an IRD of 100%, revealing that for each target, the client generated a greater number of unprompted phrases during the post-screen phase when compared to the pre-screen condition. Lastly, a comparison of independent productions one session after the target was addressed revealed that in 100% of instances the client generated more independent target utterances than was noted in the pre-screen baseline phase.

In summary, an examination of the medians for unprompted versus prompted targets revealed consistently greater medians for unprompted target productions than prompted target productions for each stage. Across the investigation the client's unprompted productions ranged from 10-28 and his prompted productions ranged from 1-8. In addition, visual inspection of the data gathered indicated positive increases in the number of unprompted targets produced from Session 1 to Session 2 for 3 of the 4 stages, and decreases in the number of prompted targets produced across sessions for all 4 stages of the intervention condition. The IQR data ranged from 1-14 for the client's unprompted productions, and 3-4 for his prompted productions.

Client Participant 3: Client 3 participated in the telepractice condition, and therefore completed on-site pre- and post-screenings, and 8 sessions via telepractice (during weeks 2-5). During the baseline phase, this participant was observed utilizing subject-verb phrases, such as "I go" and "play iPad", and a range of vocabulary from varied noun categories (such as food, clothing, and vehicles). On one occasion during the

baseline phase the client selected a preposition, but immediately verbally approximated "oops", cleared his device screen, and replaced the target with a noun. Visual inspection of the charted data revealed that for all but one of the stages of the intervention phase the client's generation of target phrases increased from Session 1 to 2 (see Figure 10 and Table 15). More specific calculations and data regarding unprompted (independent) and prompted phrases generated by the client during each stage of the intervention condition are presented below.

Figure 10: Multiple Baseline Graph for Client 3



Intervention Stage 1 – Plurals: Data revealed that Client 3 independently produced 13 plural targets during Session 1 and 14 plural targets during Session 2 (*Mdn* = 13.5, IQR = 1), yielding an increase in the number of target productions by 7.69%. With respect to prompted production of plural targets, Client 3 produced 5 prompted plural targets during Session 1 and 4 prompted plural targets during Session 2 (*Mdn* = 4.5, IQR = 1). This change in data resulted in a 20% decrease in the number of prompted plural targets generated from Session 1 to Session 2. The difference between unprompted and prompted productions across sessions was not statistically significant ($p = 1$), and there was a small effect size ($\Phi = .06$).

Intervention Stage 2 – Negatives: During the second stage of the intervention condition Client 3 produced 29 negative targets during Session 1 and 35 negative targets during Session 2 (*Mdn* = 32, IQR = 6) without clinician prompting. This represented a 20.69% increase in independent productions between sessions. With respect to prompted phrases, with support, Client 3 generated 3 negative targets during Session 1 and 4 negative targets during Session 2 (*Mdn* = 3.5, IQR = 1), with an increase of 33.33% from Session 1 to Session 2. The difference between unprompted and prompted productions across sessions was not statistically significant ($p = 1$), and the effect size was negligible ($\Phi = -.01$).

Intervention Stage 3 – Past Tense: Client 3 independently generated 15 past tense verbs during Session 1 and 27 past tense targets during Session 2 (*Mdn* = 21, IQR = 12), with an increase of 80% from Session 1 to Session 2. Client 3 required prompting to generate 12 past tense targets during Session 1 and 5 past tense targets during Session 2 (*Mdn* = 8.5, IQR = 7), yielding a 58.33% decrease in the number of prompted past tense

targets. A comparison of unprompted and prompted past tense targets generated from Session 1 to Session 2 yielded a statistically significant difference as measured by the Fisher Exact Test (p = .02). Furthermore, the Phi Coefficient was .32, and there was a medium effect size.

Intervention Stage 4 – Prepositions: During this stage, Client 3's unprompted productions decreased from 45 prepositional targets to 27 prepositional targets (*Mdn* = 36, IQR = 18) for Session 1 to Session 2. This resulted in a 40% decrease in the number of targets produced. However, Client 3's prompted productions also decreased during this stage. With assistance he generated 9 prepositions in Session 1 and 3 prepositions during Session 2 (*Mdn* = 6, IQR = 6); a decrease in number by 66.67% from Session 1 to Session 2. The difference between unprompted and prompted target generation across sessions was not statistically significant, and was p = .52; and there was a small effect size (Φ = .09).

Table 15: Descriptive and Statistical Data for Client 3

Data	Plurals		Negatives		Past Tense		Prepositions	
	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted
Session 1 #	13	5	29	3	15	12	45	9
Session 2 #	14	4	35	4	27	5	27	3
Median (*Mdn*)	13.5	4.5	32	3.5	21	8.5	36	6
Interquartile Range (IQR)	1	1	6	1	12	7	18	6
Percentage Change (%)	+7.7	-20	+20.7	**+33.3**	+80	58.3	**-40**	-66.7
Fisher's Exact Test (p)	1.0		1.0		**.02**		.52	
Phi Coefficient (Φ)	.06		-.01		.32		.09	

+ Percent Change represents a positive change across sessions; - Percent Change represents a negative change across sessions
Phi Coefficient (Φ) of 0.10 = small effect size; 0.30 = medium effect size; and 0.50 = large effect size

Pre- and Post-screen Comparison: The Improved Rate Difference (IRD) was calculated to compare the client's independent (unprompted) generation of target phrases during the pre-screen (baseline), intervention phase, and post-screen (baseline) conditions

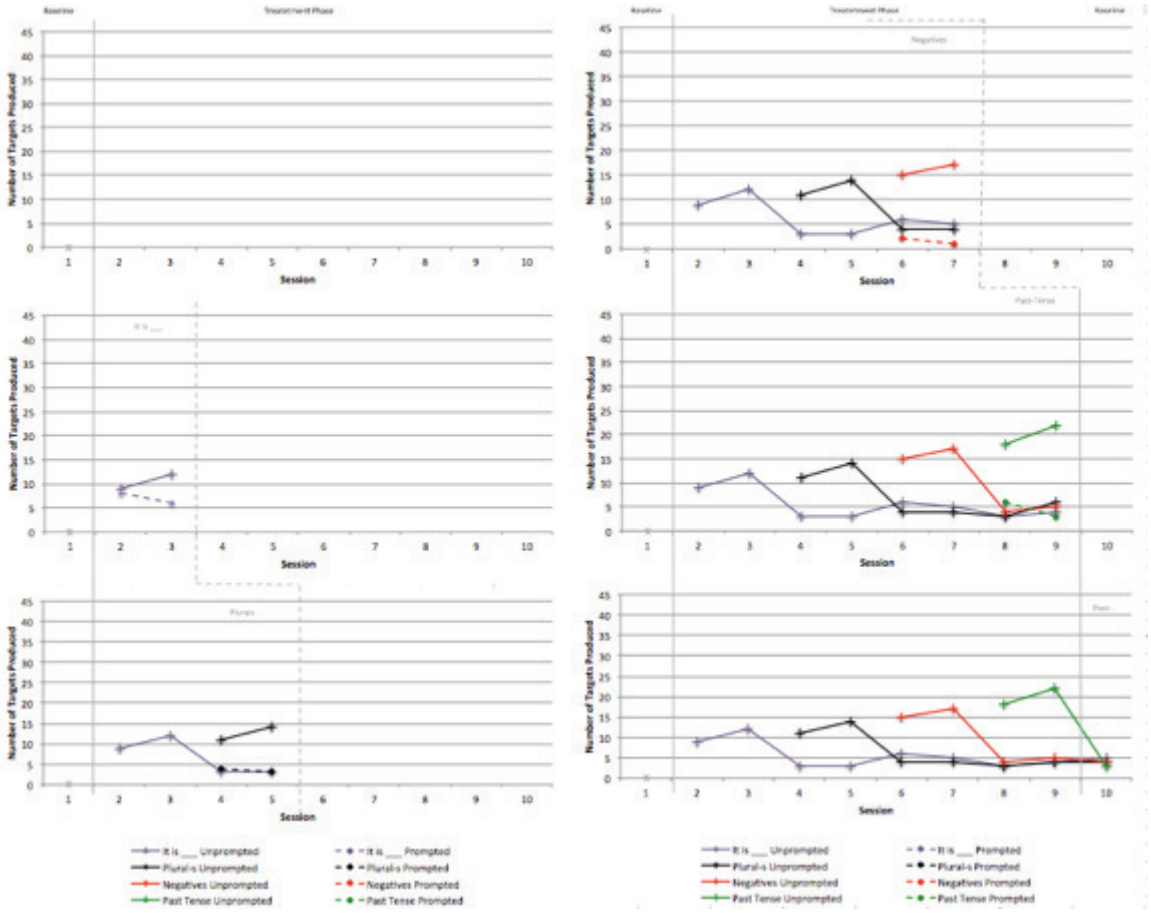
of the investigation. A comparison of pre-screen and intervention data points revealed that for 100% of intervention sessions the client generated more independent target phrases than was noted during the pre-screen, baseline condition. A comparison of pre-screen (baseline) and post-screen (baseline) data yielded an IRD of 100%, indicating that for each target, the client generated a greater number of unprompted phrases during the post-screen phase when compared to the pre-screen condition. Lastly, a comparison of independent productions one session after the target was addressed revealed that in 100% of instances the client generated more independent target utterances than was noted in the pre-screen baseline phase.

Data for unprompted versus prompted targets revealed consistently greater medians for unprompted (independent) target production when compared to prompted targets for each stage. More specifically Client 3's independent productions ranged from 13-45 and his prompted productions ranged from 3-12. Visual analysis of the data gathered indicated positive increases in the number of unprompted phrases for all stages (IQR data ranging from 1-18), and negative decreases in prompted phrases for 3 of the 4 stages of the intervention condition (with IQR data ranging from 1-7).

Client Participant 4: Client 4 participated in the telepractice condition. He completed on-site pre- and post-screenings, and 8 sessions via telepractice (weeks 1-4). During the baseline phase, Client 4 required encouragement and prompting to use his device. Although he used some nouns related to personal interest (i.e., vehicles), basic verbs, and color adjectives, he was not observed using plurals, verb conjugation, prepositions, or negative phrases. A review of Client 4's graphed data revealed small, but

consistent increases in the number of unprompted targets and decreases in the number of prompted targets from Session 1 to Session 2 for all stages of the investigation (see Figure 11 and Table 16 for details). More specific calculations and data are below.

Figure 11: Multiple Baseline Graph for Client 4



Intervention Stage 1 – Subject-Verb Phrases ("It is ___"): Data gathered on production of S+V target phrases indicated that Client 4 independently generated 9 targets during Session 1 and 12 targets during Session 2 (*Mdn* = 10.5, IQR = 3), with a 33.3% increase from Session 1 to 2. With respect to prompted targets, Client 4 produced 8 prompted S+V targets during Session 1 and 6 prompted S+V targets during Session 2

(*Mdn* = 7, IQR = 2), resulting in a 25% decrease across sessions. The difference between unprompted and prompted targets generated across sessions was not statistically significant and was calculated to be $p = .49$. The Phi Coefficient was $\Phi = .14$, and there was therefore a small effect size.

Intervention Stage 2 – Plurals: Data revealed that Client 4 independently produced 11 plural targets during Session 1 and 14 plural targets during Session 2 (*Mdn* = 12.5, IQR = 3), yielding an increase in the number of target productions by 27.27%. With respect to prompted production of plural targets, Client 3 produced 4 prompted plural targets during Session 1 and 3 prompted plural targets during Session 2 (*Mdn* = 3.5, IQR = 1). This change in data resulted in a 25% decrease in the number of prompted plural targets generated from Session 1 to Session 2. There was not a statistically significant difference between the types of targets produced across sessions ($p = .68$), and the effect size was small ($\Phi = .11$).

Intervention Stage 3 – Negatives: During this stage of the intervention condition Client 4 independently produced 15 negative targets during Session 1 and 17 negative targets during Session 2 (*Mdn* = 16, IQR = 2). This represented a 13.33% increase in independent productions between sessions. With respect to prompted phrases, Client 4 generated 2 negative targets during Session 1 and 1 negative target during Session 2 (*Mdn* = 1.5, IQR = 1), with clinician support. This represented a decrease in the number of productions by 50% from Session 1 to Session 2. The Fisher Exact Test was calculated and yielded a significance score of $p = .6$. Therefore, there was no statistically significant difference between unprompted and prompted target productions for this stage of the intervention condition, and the effect size was small ($\Phi = .11$).

Intervention Stage 4 – Past Tense: Client 4 independently generated 18 past tense verbs during Session 1 and 22 past tense verbs during Session 2 (*Mdn* = 20, IQR = 4), with a 22.2% increase in the number of productions from Session 1 to Session 2. Client 4 required prompting to generate 6 past tense targets during Session 1 and 3 past tense targets during Session 2 (*Mdn* = 4.5, IQR = 3), yielding a 50% decrease in the number of prompted past tense targets across sessions. The difference between the numbers of unprompted and prompted target productions generated across sessions was not statistically significant ($p = .29$), and the effect size was small ($\Phi = .17$).

Table 16: Descriptive and Statistical Data for Client 4

Data	S + V		Plurals		Negatives		Past Tense	
	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted
Session 1 #	9	8	11	4	15	2	18	6
Session 2 #	12	6	14	3	17	1	22	3
Median (*Mdn*)	10.5	7	12.5	3.5	16	1.5	20	4.5
Interquartile Range (IQR)	3	2	3	1	2	1	4	3
Percentage Change (%)	+33.3	-25	+27.3	-25	+13.3	-50	+22.2	-50
Fisher's Exact Test (p)	.49		.68		.6		.29	
Phi Coefficient (Φ)	.14		.11		.11		.17	

+ Percent Change represents a positive change across sessions; - Percent Change represents a negative change across sessions
Phi Coefficient (Φ) of 0.10 = small effect size; 0.30 = medium effect size; and 0.50 = large effect size

Pre- and Post-screen Comparison: The Improved Rate Difference (IRD) was calculated to compare Client 4's independent productions of target phrases during the pre-screen (baseline), intervention, and post-screen (baseline) conditions of the investigation. A comparison of pre-screen and intervention data points revealed that for 100% of intervention sessions the client generated more independent target phrases than was noted during the pre-screen, baseline condition. A comparison of pre-screen (baseline) and post-screen (baseline) data yielded an IRD of 100%, indicating that for each target, the client generated a greater number of independent phrases during the post-

screen condition when compared to the pre-screen condition. In addition, a comparison of independent productions one session after the target was addressed revealed that in 100% of instances the client generated more independent target utterances than was noted in the pre-screen baseline phase.

Overall, Client 4's data revealed consistently greater medians for unprompted (independent) target productions when compared to prompted target productions for each stage of the intervention condition of the investigation. Client 4 generated 9-22 independent targets across stages, and 1-8 prompted targets over the course of the investigation. In addition, visual inspection of the data gathered indicated positive increases in the percent difference of the number of independent productions from Session 1 to 2 for all stages of the intervention condition (IQR ranging from 10.5-20). This was contrasted by decreases in the percent difference in the number of prompted productions generated across sessions (with IQR data ranging from 1.5-7).

Overall, all client participants demonstrated an increase in unprompted target production across intervention stages when Active Consultation was offered to the PpCs. In general, the clients demonstrated an increase in the number of unprompted targets produced across sessions, and a decrease in the number of prompted targets. To determine if differences existed between the types of phrases generated by the group of clients within each stage, a Mann-Whitney *U* test was calculated. A comparison of clients' performance within each stage revealed no statistically significant difference between the number of unprompted and prompted targets production (see Table 17 for details).

Table 17: Compilation of Client Data

	S + V		Plurals		Negatives		Past Tense		Prepositions	
	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted
Cli 1			10-16	5-1	8-17	9-3	20-23	7-4	14-18	6-3
Cli 2	10-11	8-5	**16-15**	7-3	14-28	8-4	14-23	5-1		
Cli 3			13-14	5-4	29-35	3-4	15-27	12-5	**45-27**	9-3
Cli 4	9-12	8-6	11-14	4-3	15-17	2-1	18-22	6-3		
U	2.0	2.5	12	8	13.5	14	9.5	13	4.0	3.0
p	1.0	.66	.34	1	.11	.11	.68	.14	.33	.66

p>=0.05, two-tailed test

Group Results

In order to compare the outcome of services provided on-site versus via telepractice a visual analysis of data from the two cohorts in each condition was conducted. Outcome data of client participants in the on-site condition was compared to the outcome data of the client participants in the telepractice condition. Visual inspection and statistical analyses were performed on the number of unprompted and prompted target phrases produced by each group in each condition, and are discussed and presented in Figure 11 and Table 40 of the section that follows.

Research Question 3: On-site Versus Telepractice Comparison

With respect to Research Question 3, visual inspection and statistical calculations revealed no statistically significant difference between the number of unprompted and prompted targets generated by clients when receiving services on-site versus via telepractice. On-site and telepractice cohort data are detailed below:

A visual analysis of the data gathered for the on-site and telepractice cohorts was conducted to determine whether any patterns were evident between the two groups. In general, the participants in the on-site cohort demonstrated positive percent changes in

the number of unprompted targets produced, and negative percent changes in the number of prompted targets produced from Session 1 to 2 within each stage. In one instance, during Stage 2, Client 2 demonstrated a 6.3% decrease in the number of unprompted targets produced in Session 2 when compared to Session 1 (see Table 18 for details).

Table 18: Target Phrase Generation Data for On-Site Cohort Clients

	Cohort 1 Participants					
	Client 1			Client 2		
	Session 1	Session 2	% Change	Session 1	Session 2	% Change
Baseline (pre-)						
Unprompted	0	-	-	0	-	-
Stage 1						
Unprompted	10	16	60% increase	10	11	10% increase
Prompted	5	1	80% decrease	8	5	37.5% decrease
Stage 2						
Unprompted	8	17	112% increase	16	15	*6.3% decrease
Prompted	9	3	66.7% decrease	7	3	57.1% decrease
Stage 3						
Unprompted	20	23	15% increase	14	28	100% increase
Prompted	7	4	42.9% decrease	8	4	50% decrease
Stage 4						
Unprompted	14	18	28.6% increase	14	23	64.3% increase
Prompted	6	3	50% decrease	5	1	80% decrease
Baseline (post)						
Unprompted	15	-	-	18	-	-

* percentage change is not concordant with general trend in data
Each stage addressed a different language act (S+V phrases, plurals, negatives, prepositions, or past tense)

The telepractice cohort data was consistent with the on-site cohort data. Generally, the participants in the telepractice cohort demonstrated positive percent changes in the number of unprompted targets produced, and negative percent changes in the number prompted targets produced from Session 1 to 2 within each stage. In one instance, during Stage 4, Client 3 demonstrated a 40% decrease in the number of unprompted targets produced in Session 2 when compared to Session 1 (see Table 19).

Table 19: Target Phrase Generation Data for Telepractice Cohort Clients

	Cohort 2 Participants					
	Client 3			Client 4		
	Session 1	Session 2	% Change	Session 1	Session 2	% Change
Baseline (pre-)						
Unprompted	1	-	-	0	-	-
Stage 1						
Unprompted	13	14	7.69% increase	9	12	33.3% increase
Prompted	5	4	20% decrease	8	6	25% decrease
Stage 2						
Unprompted	29	35	20.7% increase	11	14	27.3% decrease
Prompted	3	4	33.3% decrease	7	3	25% decrease
Stage 3						
Unprompted	15	27	80% increase	14	28	13.3% increase
Prompted	12	5	58.3% decrease	4	3	50% decrease
Stage 4						
Unprompted	45	27	*40% decrease	15	17	22.2% increase
Prompted	9	3	66.7% decrease	2	1	50% decrease
Baseline (post)						
Unprompted	15	-	-	16	-	-

* percentage change is not concordant with general trend in data
Each stage addressed a different language act (S+V phrases, plurals, negatives, prepositions, or past tense)

To determine group difference between the two conditions, a Mann-Whitney *U* test was calculated. This analysis compared whether one of the two samples (i.e., on-site or telepractice conditions) had larger values than the other. Although comparisons were made with a small n, and relatively small data set, the comparison of the group data is essential to the determination whether or not telepractice service delivery is as effective as on-site service delivery. As seen in Table 20, there was no significant difference in client outcome measures between the numbers of unprompted or prompted phrases generated by the clients in either service delivery condition. More specifically, a comparison of unprompted target generation was U=148, p = .47 and therefore not statistically significant. A comparison of prompted target production was U=146.5, p = .49, and was also not statistically significant.

Table 20: Cohort Comparison of Unprompted and Prompted Targets Generated

	Mann-Whitney *U* Test	
	U	Significance
Cohort 1 and Cohort 2 Unprompted Scores	148	.47
Cohort 1 and Cohort 2 Prompted Scores	146.5	.49

p>=0.05, two-tailed test

Inter-Observer Reliability

A doctoral researcher and Master's level speech language pathology students (not affiliated with the investigation) served as observers for the study. Inter-observer reliability (IOR) measures were conducted for 20% of the intervention session data obtained during on-site and telepractice conditions. Session data for both the pre-professional clinicians and the clients were randomly selected. Inter-observer reliability was calculated by dividing the number of agreements of coded data by the total number of possible agreements and multiplying by 100. The percentage of agreement for this study was 92.5%, which is considered high inter-rater reliability (Jackson, 2006)

Social Validity

To determine clinician satisfaction of Active Consultation the pre-professional clinicians completed surveys after each session. The surveys asked the pre-professional clinicians to rate six statements regarding Active Consultation as either (1) Not Very Good; (2) Below Average; (3) Average; (4) Above Average; or (5) Very Good. The greater the score for each item the more positive the clinicians' perception of the specific statement (with 5 being the highest). Please see Appendix F for details regarding the survey.

All of the pre-professional clinicians completed all of the surveys each week (i.e.,

during each stage) of the intervention condition. Over the course of the investigation, the PpCs' rating, and therefore perception, of the Active Consultation supervisory support increased from week to week (see Table 21). The summed median for all PpCs at the start of the study was 4.25. This increased to 4.5 during Stage 2, remained at 4.5 during Stage 3, and increased to 5 by Stage 4 (see Table 21).

Table 21: Median Pre-professional Clinicians' Responses to the Survey Per Stage

Question	Average Pre-professional Clinician Rating			
	Stage 1	Stage 2	Stage 3	Stage 4
Delivery of supervisory feedback during the session (Active Consultation).	3.5	4	4.5	5
The quality (relevance) of the feedback you receive via Active Consultation,	4.5	4.5	5	5
Your ability to communicate with the clinician/supervisor during the session.	4	4.5	4.5	5
Your attitude about the supervision you received (via Active Consultation)	4.5	5	4.5	5
How effective do you think this form of supervision was/is on the service you provided?	4	4.5	4.5	5
What is the likelihood that you would recommend this form of supervision to your colleague?	4.5	4.5	4.5	5
Aggregate Median Score	4.25	4.5	4.5	5

A comparison of PpC survey responses at Stage 1 and Stage 4 of the investigation revealed the most notable changes with respect to the delivery of the supervisory feedback during the sessions (statement 1 rising from a median score of 3 to 5), the clinician's ability to communicate with the supervisor, and the effectiveness of the supervision (statements 3 and 5, both rising from median scores of 4 to 5). Lastly, a comparison of aggregated response scores at Stage 1 and Stage 4 revealed a statistically significant difference in PpC responses ($U = 36$, $p = .002$, two-tailed test).

CHAPTER IV

DISCUSSION

This investigation addresses three distinct research questions. The first pertains to whether or not there is an increase in the unprompted production of target phrases modeled by pre-professional clinicians when receiving Active Consultation. The results indicate that there is an increase in the independent target productions of novice clinicians receiving Active Consultation. Although calculations reveal a statistically significant difference in target productions for only one of the pre-professionals clinicians (specifically PpC 4 who, in the last stage of the investigation, produced 16 and 26 unprompted productions and 4 and 0 prompted past tense targets across sessions), data gathered from each of the participants follows a similar pattern: their unprompted, independent productions increased from Session 1 to Session 2, while their prompted productions decreased. This is consistent for all participants for all stages, except PpC2, who generated fewer plural targets during the second session of stage 2 of the intervention condition, while her prompted productions remained the same. A careful, post-hoc review of the session reveals that the clinician spent time redirecting the client due to his increased level of fatigue that day, and therefore less time was spent on addressing the session's goal.

The consistency of each PpC's performance suggests that novice clinicians, without any prior AAC experience or training, are able to engage in the evidence-based technique of AAC modeling when offered supervisory guidance via Active Consultation. In addition, the prompting required to support the PpCs' modeling of specific targets generally decreases across sessions, while the PpCs simultaneously generate more

independent AAC models.

The second research question pertains to whether or not there is an increase in the clients' unprompted production of target phrases when the PpCs receive Active Consultation. The results indicate that there is an increase in the clients' unprompted, independent target productions when their treating clinician receives Active Consultation. Statistical calculations show a significant difference in independent target productions for only one of the clients (specifically Client 3 who, in the third stage of the investigation, independently produced 15 and 27 past tense targets and 12 and 5 prompted targets across sessions). However, consistent with the PpCs, data gathered from each of the clients follows a similar pattern: their unprompted productions increased from Session 1 to Session 2, while their prompted productions decreased. This pattern holds true for all clients for all stages, except Client 2 and Client 3, who generated fewer independent targets in Session 2 when compared to Session 1. More specifically, Client 2 generated only 1 less plural target during the second session of stage 2. Client 3 produced fewer prepositional targets during the last stage of the intervention condition; but still generated 27 independent productions. A post-hoc review of Client 3's performance revealed that he was excited and easily distracted during the session, and he was laughing and appeared to be trying to joke with the clinician.

In general, the client participants generated anywhere between 15 and 54 targets (unprompted or prompted) per session. Some targets require more co-articulated motor movements than others. For example, creating a subject + verb phrase can take 4 button selections, whereas stating a preposition takes only 2. The lowest numbers of total targets generated were noted in week one of the intervention when Client 2 and Client 4 were

working on S + V phrases (and only generated 15-16 targets). The greatest number of targets produced was noted in week 5 when Client 3 worked on prepositions and generated 54 targets in one 30-minute session. The motor demand combined with individual variability and other extraneous factors account for the variance amongst the data. However, with respect to the types of phrases generated, there was no statistically significant difference between the clients within each stage (please review Tables 18, 19, and 20 for specific data and calculations).

The consistency of each client's performance indicates that their independent production of target phrases increases across sessions, while their prompted productions decrease. This contrasting change in performance coincides with the PpCs' performance when receiving Active Consultation (i.e., when the PpC is being guided to model prepositions, the client produces prepositional targets). In fact, by combining the PpC and client data displayed in Tables 12 and 17 of the "Results" section (as done in Table 22), it is clear that the data patterns, and number of targets produced, are similar for both the pre-professionals and the clients irrespective of whether or not services were provided on-site or via telepractice.

Table 22: Side-by-Side Comparison of Client and Pre-Professional Clinician Data

	S + V		Plurals		Negatives		Past Tense		Prepositions	
	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted	Unprompted	Prompted
Cli 1			10-16	5-1	8-17	9-3	20-23	7-4	14-18	6-3
PpC 1			13-21	5-2	11-15	6-3	23-27	5-2	15-17	4-1
Cli 2	10-11	8-5	16-15	7-3	14-28	8-4	14-23	5-1		
PpC 2	11-20	7-7	19-10	4-1	22-33	5-2	14-24	5-2		
Cli 3			13-14	5-4	29-35	3-4	15-27	12-5	45-27	9-3
PpC 3			15-19	10-4	28-33	14-8	23-30	10-7	33-27	2-2
Cli 4	9-12	8-6	11-14	4-3	15-17	2-1	18-22	6-3		
PpC 4	9-17	5-2	12-14	6-3	11-15	6-3	16-26	4-0		

Green text indicates a positive increase in number of productions, whereas red text indicates a negative decrease in productions

Furthermore, the IRD data indicates that all clients produced a greater number of unprompted target productions during the intervention stages and at the end of the investigation, when compared to their baseline performance as measured by their pre-screen results. Although unable to prove causality, this data suggests that when pre-professional clinicians receive Active Consultation supervisory guidance regarding how and what phrases to the model, the number of targets generated by the clients increases. This is concordant with the literature that describes the positive effect communication partner AAC modeling has on the productions generated by individuals using AAC.

The third research question of the investigation is regarding whether or not there is a difference in client outcome data when treatment is provided on-site or via telepractice. As discussed in the section above, all clients demonstrated similar treatment outcomes and data trends. Furthermore, visual inspection and statistical calculations reveal no statistically significant difference between the number of unprompted and prompted targets generated by clients when receiving services on-site versus via telepractice. The results indicate that it may be possible for individuals using AAC to receive evidence-based intervention services on-site or via telepractice. It is also encouraging to note the overall output generated each 30-minute session completed in either the on-site or telepractice setting (i.e., the number of language acts generated by the clients when receiving services).

Furthermore, the above-mentioned data and the positive feedback provided by the PpCs regarding Active Consultation (AC) validates the effectiveness of AC as a supervisory method. This is further substantiated by the PpCs' comments provided on the weekly surveys. The comments were as follows:

"The Active Consultation is extremely helpful in learning the device – I think this would be a very good method in terms of therapy and future success specifically with AAC users and gaining access to other clinicians"

"The advantage of Active Consultation is the direct feedback on how to engage the client"

"It was very helpful to be supervised throughout the session"

"The supervisor's instructions were clear and simple"

"This form of supervision is allowing me to learn the device at a fast pace"

"I feel that I am learning how to use the device and remembering what I learned in previous sessions…I also feel more comfortable expanding on the supervisor's instructions"

"This form of supervision allows me to modify the treatment I provide during the session in order to meet the client's needs.

"During the session, I often provide models for the client independently, however the supervisor is available to provide reminders when necessary"

Based on this information, it is evident that Active Consultation is an effective supervisory method that empowers novice clinicians to learn how to model a variety of language acts on relatively complex AAC systems, within a very short period of time.

Limitations

There are several limitations associated with this study. As previously stated, this investigation includes a small number of PpCs and AAC users (who used only one kind of device). As such, the ability to generalize the results to other PpCs, AAC users, and AAC device types is limited. In addition, the uniqueness of this investigation requires use of a quasi-experimental and qualitative research design, rather than a more tightly

controlled quantitative design. There is, therefore, less experimental control exerted throughout the study.

Maturation is a limitation of this study. The quick succession of stages helps ensure the novelty and challenge of the session goal, but it is inevitable that PpC and client learning will take place during the course of the study. It is also important to note that the embedded probes were not standardized, nor was there a target number of probes to be completed each session. This, and the very design of the study, significantly limits the ability to compare individual participants to one another. In addition, pre-determined intervention materials were used to ensure consistency across sessions and clients. Therefore, materials were not developed based on each client's interest and preference.

The equipment, cohorts, and timing were kept as consistent as possible; however, due to scheduling factors not all clients could participate during the last week of the investigation, and it is for that reason that cohorts completed the study either during weeks 1-4 or 2-5.

Lastly, there were initial technological challenges associated with cellular reception and data sharing via the Internet. Given the construction of the building in which the investigation was conducted cellular calls were sometimes dropped. Supervising clinicians adjusted their location to maximize their cellular reception and minimize the number of failed calls. In the case of a dropped call the supervising clinician initiated the call and the pre-professional clinicians answered the incoming call via the Bluetooth™ headset while engaging in intervention to ensure quick re-connection with the supervising clinician.

Although the computers were hard-wired to the Internet, the sheer amount of content shared simultaneously compromised the quality of the data transmission. In an effort to alleviate this the GoToMeeting session associated the webcam of the Adjustable J-Mount© was minimized and all other programs running on that computer were turned off. In addition, only GoToMeeting and the Big Universe were running on the other computers. All technical difficulties were resolved as quickly as possible and were only present during the first week of the investigation (with the exception of sporadic dropped calls which diminished as the study progressed). The initial technical difficulties, although fixed rapidly by on-site personnel, did delay the session start time by a few minutes. It is possible that with more advanced computers with improved specifications, some of these difficulties may have been minimized or reduced entirely.

Conclusions

The purpose of this investigation was to: 1) determine the impact of Active Consultation on the number of unprompted and prompted phrases modeled by pre-professional clinicians; 2) examine the effect Active Consultation may have on the number of unprompted and prompted phrases generated by the client; and 3) determine whether or not a significant difference exists between intervention outcomes of services provided onsite vs. via telepractice. The results indicate that novice PpCs can learn very quickly how to model a variety of language acts to engage in AAC modeling when receiving Active Consultation. The results also suggest that the effect the supervisory guidance has on the PpCs impacts the output of the AAC device user. Lastly, the results

demonstrate similar intervention success when services are provided on-site as compared to via telepractice.

Although this investigation involves a small number of participants the implications are tremendous. As previously mentioned, there is a critical shortage of SLPs (especially SLPs who offer AAC services) and an unmet need of the AAC population. In addition, there are significant weaknesses with respect to AAC-specific pre-professional training and clinical opportunities. This study offers some of the first data regarding how all of these challenges can be addressed through the systematic application of telepractice technologies to implement AAC evidence-based practices in the context of intervention and clinical practicum opportunities irrespective of geographic locale.

The real-time supervision model of Active Consultation helps novice PpCs learn new and challenging skills while in the context of actual AAC intervention with individuals in need of services. In addition, by using telecommunication technologies individuals in need of services can access evidence-based interventions irrespective of their geographical location, and PpCs and/or their supervisors maximize time and efficiency by staying in a central location. Furthermore, the proprietary equipment developed for this investigation (namely the Adjustable J-Mount©), significantly broadens the tele-AAC candidacy pool by allowing for real-time AAC modeling and service intervention for individuals who may not be literate and therefore dependent on the videographic representation of device navigation.

Future Research

This investigation served to examine whether or not concurrent direct (intervention) and indirect (supervision) AAC service delivery via telepractice was feasible. The findings of this study offer compelling support that this is, in fact, possible. However, each research question should be explored in greater detail to fully understand the independent and combined effect of Active Consultation on PpC and client target production. In addition, a more thorough comparison of on-site and telepractice AAC service delivery needs to be performed.

Given the success providing direct and indirect, synchronous tele-AAC services it is essential that this research continue to be investigated. Future research should replicate the existing study, and or individual research questions, to support generalization of the results to a greater number, and more diverse group of AAC users. It is critical that additional research is done to explore different populations of AAC users and examine whether or not differences exist in their receptiveness and success with tele-AAC.

This investigation should also be replicated to expand the training opportunity to other professionals and family members. With the increased acceptable use of AAC with younger, early childhood populations it will be critically important to support family members and their knowledge of AAC, as well as how to implement AAC in natural environments. In addition, inclusive education and advancements in assistive technologies sees a growing number of students with low-incidence diagnoses in general education environments. It is of paramount importance that teachers, paraprofessionals, and other related service personnel receive training regarding AAC implementation.

Lastly, further research must be done to solidify the technological requirements of both direct and indirect tele-AAC services. In addition, the increased availability of integrated AAC systems (i.e., systems with built-in Internet capabilities) reduces the dependency on a second computer for tele-AAC service delivery and needs to be carefully explored and investigated.

APPENDIX A

MASSACHUSETTS DISTRICT-SPECIFIC SPECIAL EDUCATION INFORMATION

District	County	City	# of Children with Special Ed	% of Children with Special Ed
Abby Kelley Foster Charter Public	Worcester	Worcester	139	9.7
Abington	Plymouth	Abington	348	15.6
Academy of Strategic Learning Charter School District	Essex	Amesbury	n/a	n/a
Academy Of the Pacific Rim Charter Public	Suffolk	Hyde Park	71	14.7
Acton	Middlesex	Acton	392	14.9
Acton-Boxborough	Middlesex	Acton	424	14.2
Acushnet	Bristol	Acushnet	216	20.9
Adams-Cheshire	Berkshire	125 Savoy Road	244	15.7
Advanced Math and Science Academy Charter	Middlesex	201 Forest Street	37	4.6
Agawam	Hampden	Feeding Hills	687	15.7
Amesbury	Essex	Amesbury	389	15.8
Amesbury Academy Charter Public School	Essex	Amesbury	18	36
Amherst	Hampshire	Amherst	254	19.2
Amherst-Pelham	Hampshire	Amherst	331	19.7
Andover	Essex	Andover	1034	16.5
Arlington	Middlesex	Arlington	739	15.4
Ashburnham-Westminster	Worcester	Ashburnham	436	18.0
Ashland	Middlesex	Ashland	365	13.7
Assabet Valley Regional Vocational Technical	Middlesex	Marlborough	287	29.8
Athol-Royalston	Worcester	Athol	417	24.6
Atlantis Charter	Bristol	Fall River	90	12.3
Attleboro	Bristol	Attleboro	948	15.9
Auburn	Worcester	Auburn	306	12.7
Avon	Norfolk	Avon	128	17.0
Ayer	Middlesex	Ayer	246	20.2
Barnstable	Barnstable	Hyannis	615	14.2
Barnstable Community Horace Mann Charter Public	Barnstable	Hyannis	33	9.9
Barnstable Horace Mann Charter	n/a	Marstons Mills	91	11.5
Bedford	Middlesex	Bedford	447	17.7
Belchertown	Hampshire	Belchertown	425	16.1
Bellingham	Norfolk	Bellingham	335	12.6
Belmont	Middlesex	Belmont	436	10.8
Benjamin Banneker Charter Public	Middlesex	Cambridge	327	17
Benjamin Franklin Classical Charter Public	Norfolk	Franklin	30	6.9
Berkley	Bristol	Berkley	154	16.5

Berkshire Arts and Technology Charter Public	Berkshire	Adams	57	26.4
Berkshire Hills	Berkshire	Stockbridge	200	14.5
Berlin	Worcester	Boylston	45	21.1
Berlin-Boylston	Worcester	Boylston	67	14.7
Beverly	Essex	Beverly	892	20.4
Billerica	Middlesex	Billerica	1087	18.0
Blackstone-Millville	Worcester	Upton	339	16.3
Blackstone Valley Regional Vocational Technical	Worcester	Blackstone	140	12.3
Blue Hills Regional Vocational Technical	Norfolk	Canton	217	25.8
Boston	Suffolk	Dorchester	10898	19.6
Boston Collegiate Charter	Suffolk	Hyde Park	88	17.3
Boston Day and Evening Academy Charter	Suffolk	Boston	43	15.4
Boston Preparatory Charter Public	n/a	Boston	53	15.8
Boston Renaissance Charter Public	Suffolk	Boston	113	9.4
Bourne	Barnstable	Bourne	376	15.7
Boxborough	Middlesex	Boxborough	65	12.9
Boxford	Essex	Boxford	144	15.7
Boylston	Worcester	Boylston	40	10.6
Braintree	Norfolk	Braintree	1103	20.2
Brewster	Barnstable	Orleans	70	13.9
Bridgewater-Raynham	Bristol	Bridgewater	874	14.9
Brimfield	Worcester	Fiskdale	42	12.2
Bristol-Plymouth Regional Vocational Technical	Bristol	Taunton	187	15.5
Bristol County Agricultural	Bristol	Dighton	50	11.3
Brockton	Plymouth	Brockton	2198	14.0
Brookfield	Worcester	Fiskdale	47	15.5
Brookline	Norfolk	Brookline	1098	16.8
Burlington	Middlesex	Burlington	529	13.9
Cambridge	Middlesex	Cambridge	1328	21.7
Canton	Norfolk	Canton	470	14.8
Cape Cod Lighthouse Charter	Barnstable	Orleans	28	12.3
Cape Cod Regional Vocational Technical	Barnstable	Harwich	203	29.6
Carlisle	Middlesex	Carlisle	100	14.2
Carver	Plymouth	Carver	278	14.8
Central Berkshire	Berkshire	Dalton	318	15.9
Chatham	Barnstable	Chatham	97	14.3
Chelmsford	Middlesex	North Chelmsford	875	15.9
Chelsea	Suffolk	Chelsea	797	13.8
Chesterfield-Goshen	Hampshire	Westhampton	20	10.6
Chicopee	Hampden	Chicopee	1299	16.5
Christa McAuliffe Regional Charter Public	Middlesex	Framingham	62	30.7
City On A Hill Charter	Suffolk	Roxbury	36	12.6

Public				
Clarksburg	Berkshire	North Adams	33	18.9
Clinton	Worcester	Clinton	381	18.9
Codman Academy Charter Public	Suffolk	Dorchester	32	25.4
Cohasset	Norfolk	Cohasset	179	11.8
Community Charter School of Cambridge	Middlesex	Cambridge	51	18.3
Community Day Charter Public	Essex	Lawrence	62	18.7
Concord	Middlesex	Concord	375	19.3
Concord-Carlisle	Middlesex	Concord	212	16.5
Conservatory Lab Charter	Suffolk	Brighton	19	12.4
Conway	Franklin	South Deerfield	32	18.3
Danvers	Essex	Danvers	608	16.5
Dartmouth	Bristol	Dartmouth	509	12.5
Dedham	Norfolk	Dedham	648	21.8
Deerfield	Franklin	South Deerfield	75	15.3
Dennis-Yarmouth	Barnstable	South Yarmouth	509	15.0
Dighton-Rehoboth	Bristol	North Dighton	474	14.5
Dorchester Collegiate Academy Charter	n/a	Dorchester	3	7.5
Douglas	Worcester	Douglas	283	16
Dover	Norfolk	Dover	59	10.2
Dover-Sherborn	Norfolk	Dover	164	13.9
Dracut	Middlesex	Dracut	484	11.7
Dudley-Charlton Reg	Worcester	Dudley	562	12.8
Duxbury	Plymouth	Duxbury	427	12.9
East Bridgewater	Plymouth	East Bridgewater	329	13.6
Eastham	Hampden	East Longmeadow	38	16.9
Easthampton	Barnstable	Orleans	283	17.8
East Longmeadow	Hampshire	Easthampton	632	21.7
Easton	Bristol	North Easton	695	17.6
Edgartown	Dukes	Vineyard Haven	58	17.7
Edward Brooke Charter	Suffolk	Roslindale	36	8.2
Edward M. Kennedy Academy for Health Careers	n/a	Boston	14	6.6
Erving	Franklin	Erving	30	16.9
Essex Agricultural Technical	Essex	Hathorne	86	18.6
Everett	Middlesex	Everett	971	16.2
Excel Academy Charter	Suffolk	Boston	21	9.9
Fairhaven	Bristol	Fairhaven	354	17.6
Fall River	Bristol	Fall River	1823	18.3
Falmouth	Barnstable	East Falmouth	668	17.5
Farmington River Reg	Berkshire	Otis	25	16.9
Fitchburg	Worcester	Fitchburg	1066	20.9
Florida	Berkshire	Florida	27	23.5
Four Rivers Charter Public	Franklin	Greenfield	22	11.4
Foxborough	Norfolk	Foxborough	488	16.9
Foxborough Regional Charter	Norfolk	Foxborough	107	9.4

Framingham	Middlesex	Framingham	1796	21.6
Francis W. Parker Charter Essential	Middlesex	Devens	51	13.0
Franklin	Franklin	Franklin	1013	16.4
Franklin County Regional Vocational Technical	Norfolk	Franklin	115	22.5
Freetown	Plymouth	Lakeville	81	15.0
Freetown-Lakeville	Plymouth	Lakeville	354	18.2
Frontier	Franklin	South Deerfield	165	22.8
Gardner	Worcester	Gardner	498	18.8
Gateway	Hampshire	Huntington	175	14.4
Georgetown	Essex	Georgetown	238	14.0
Gill-Montague	Franklin	Turners Falls	227	20.7
Global Learning Charter Public	Bristol	New Bedford	45	10.3
Gloucester	Essex	Gloucester	717	20.9
Gosnold	Bristol	Rehoboth	n/a	n/a
Grafton	Worcester	Grafton	499	17.1
Granby	Hampshire	Granby	191	16.9
Granville	Hampden	Southwick	27	16.2
Greater Fall River Regional Vocational Technical	Bristol	Fall River	141	10.4
Greater Lawrence Regional Vocational Technical	Essex	Andover	260	21.8
Greater Lowell Regional Vocational Technical	Middlesex	Tyngsborough	416	20.7
Greater New Bedford Regional Vocational Technical	Bristol	New Bedford	168	8.0
Greenfield	Franklin	Greenfield	304	20.0
Groton-Dunstable	Middlesex	Groton	389	13.8
Hadley	Hampshire	Hadley	80	11.1
Halifax	Plymouth	Kingston	90	13.4
Hamilton-Wenham	Essex	Wenham	320	15.6
Hampden-Wilbraham	Hampden	Wilbraham	717	19.5
Hampden Charter School of Science	n/a	n/a	9	4.7
Hampshire	Hampshire	Westhampton	145	17.4
Hancock	Berkshire	Richmond	5	9.8
Hanover	Plymouth	Hanover	429	15.8
Harvard	Worcester	Harvard	212	16.3
Harwich	Barnstable	Harwich	214	15.9
Hatfield	Hampshire	Hatfield	67	14.5
Haverhill	Essex	Haverhill	1432	20.8
Hawlemont	Franklin	Shelburne Falls	29	26.6
Health Careers Academy Charter	Suffolk	Boston	n/a	n/a
Hilltown Cooperative Charter Public	Hampshire	Haydenville	23	14.2
Hill View Montessori Charter Public	Essex	Haverhill	42	15.4
Hingham	Plymouth	Hingham	549	13.4
Holbrook	Norfolk	Holbrook	253	21.0
Holland	Worcester	Fiskdale	43	16.9

Holliston	Middlesex	Holliston	369	16.2
Holyoke	Hampden	Holyoke	1515	25.2
Holyoke Community Charter	Hampden	Holyoke	72	10.2
Hopedale	Worcester	Hopedale	223	16.9
Hopkinton	Middlesex	Hopkinton	453	13.0
Hudson	Middlesex	Hudson	566	18.9
Hull	Plymouth	Hull	201	16.4
Innovation Academy Charter	Middlesex	Tyngsborough	106	19.8
Ipswich	Essex	Ipswich	317	14.7
King Philip	Norfolk	Norfolk	300	14.2
Kingston	Plymouth	Kingston	166	13.7
KIPP Academy Lynn Charter	Essex	Lynn	44	12.5
Lakeville	Plymouth	Lakeville	126	16.9
Lanesborough	Berkshire	Lanesboro	45	16.7
Lawrence	Essex	Lawrence	2466	19.8
Lawrence Family Development Charter	Essex	Lawrence	37	6.2
Lee	Berkshire	Lee	107	12.7
Leicester	Worcester	Leicester	325	17.0
Lenox	Berkshire	Lenox	83	10
Leominster	Worcester	Leominster	115	17.5
Leverett	Franklin	Erving	30	18.2
Lexington	Middlesex	Lexington	1059	16.9
Lincoln	Middlesex	Lincoln	124	11.8
Lincoln-Sudbury	Middlesex	Sudbury	290	17.6
Littleton	Middlesex	Littleton	301	18.4
Longmeadow	Hampden	Longmeadow	595	18.9
Lowell	Middlesex	Lowell	2117	15.8
Lowell Community Charter Public	Middlesex	Lowell	104	11.0
Lowell Middlesex Academy Charter	Middlesex	Lowell	31	25.6
Ludlow	Hampden	Ludlow	522	16.8
Lunenburg	Worcester	Lunenburg	259	15.2
Lynn	Essex	Lynn	2204	16.3
Lynnfield	Essex	Lynnfield	295	12.4
Ma Academy for Math and Science	Worcester	Worcester	n/a	n/a
Malden	Middlesex	Malden	944	14.8
Manchester Essex Regional	Essex	Manchester	226	15.2
Mansfield	Bristol	Mansfield	883	17.9
Marblehead	Essex	Marblehead	507	15.6
Marblehead Community Charter Public	Essex	Marblehead	229	17.0
Marion	Plymouth	Mattapoisett	69	15.6
Marlborough	Middlesex	Marlborough	993	21.5
Marshfield	Plymouth	Marshfield	818	17.1
Martha's Vineyard Charter	Dukes	West Tisbury	33	18.0
Martha's Vineyard	Dukes	Vineyard Haven	175	24.7
Martin Luther King Jr. Charter School of	Hampden	Springfield	34	9.0

Excellence				
Masconomet	Essex	Topsfield	287	13.5
Mashpee	Barnstable	Mashpee	304	16.2
MATCH Charter Public School	Suffolk	Boston	54	14.1
Mattapoisett	Plymouth	Mattapoisett	73	14.1
Maynard	Middlesex	Maynard	223	16.6
Medfield	Norfolk	Medfield	369	12.1
Medford	Middlesex	Medford	921	18.8
Medway	Norfolk	Medway	495	18.2
Melrose	Middlesex	Melrose	506	13.3
Mendon-Upton	Worcester	Mendon	346	12.0
Methuen	Essex	Methuen	1005	13.7
Middleborough	Plymouth	Middleborough	595	16.8
Middleton	Essex	Boxford	146	17.0
Milford	Worcester	Milford	619	14.8
Millbury	Worcester	Millbury	353	18.5
Millis	Norfolk	Millis	204	14.0
Milton	Norfolk	Milton	590	14.7
Minuteman Regional Vocational Technical	Middlesex	Lexington	257	44.1
Mohawk	Franklin	Shelburne Falls	222	19.5
Monson	Hampden	Monson	195	13.6
Montachusett Regional Vocational Technical	Worcester	Fitchburg	217	16.0
Mount Greylock	Berkshire	Williamstown	93	14.5
Mystic Valley Regional Charter	Middlesex	Malden	100	7.4
Nahant	Essex	Nahant	24	9.8
Nantucket	Nantucket	Nantucket	194	15.6
Narragansett	Worcester	Baldwinville	248	15.6
Nashoba	Worcester	Bolton	412	11.9
Nashoba Valley Regional Vocational Technical	Middlesex	Westford	208	31.4
Natick	Middlesex	Natick	723	15.1
Nauset	Barnstable	Orleans	243	15.7
Needham	Norfolk	Needham	721	13.5
Neighborhood House Charter	Suffolk	Dorchester	57	14.3
New Bedford	Bristol	New Bedford	2441	19.2
Newburyport	Hampden	Springfield	363	16.0
New Leadership Charter	Franklin	Erving	51	11.3
New Salem-Wendell	Essex	Newburyport	23	16.0
Newton	Middlesex	Newtonville	2315	19.5
Norfolk	Norfolk	Walpole	169	15.7
Norfolk County Agricultural	Norfolk	Norfolk	66	14.0
North Adams	Berkshire	North Adams	400	24.6
Northampton	Hampshire	Northampton	571	20.9
Northampton-Smith Vocational Agricultural	Hampshire	Northampton	197	42.5
North Andover	Essex	North Andover	634	13.5
North Attleborough	Bristol	North Attelboro	790	16.5
Northboro-Southboro	Worcester	Southboro	142	10.0

Northborogh	Worcester	Southboro	267	14.1
Northbridge	Worcester	Whitinsville	429	16.7
North Brookfield	Worcester	North Brookfield	96	15.2
North Central Charter Essential	Worcester	Fitchburg	62	16.5
Northeast Metropolitan Regional Vocational Technical	Middlesex	Wakefield	330	26.4
Northern Berkshire Regional Vocational Technical	Berkshire	North Adams	87	17.4
North Middlesex	Middlesex	Townsend	727	17.6
North Reading	Middlesex	North Reading	426	15.3
North Shore Regional Vocational Technical	Essex	Middleton	155	34.4
Norton	Bristol	Norton	531	18.5
Norwell	Plymouth	Norwell	319	13.5
Norwood	Norfolk	Norwood	608	17.4
Oak Bluffs	Dukes	Vineyard Haven	91	22.3
Old Colony Regional Vocational Technical	Plymouth	Rochester	119	20.4
Old Rochester	Plymouth	Mattapoisett	133	11.6
Orange	Franklin	Orange	123	14.6
Orleans	Barnstable	Orleans	46	24.2
Oxford	Worcester	Oxford	305	14.8
Palmer	Hampden	Palmer	310	17.3
Pathfinder Regional Vocational Technical	Hampden	Palmer	230	34.8
Peabody	Essex	Peabody	1183	19.1
Pelham	Hampshire	Amherst	30	24.0
Pembroke	Plymouth	Pembroke	477	13.7
Pentucket	Essex	West Newbury	550	16.8
Petersham	Worcester	Petersham	8	7.5
Phoenix Charter Academy	Suffolk	Chelsea	17	10.4
Pioneer Charter School of Science	Middlesex	Everett	13	5.5
Pioneer Valley	Hampshire	Hadley	187	15.9
Pioneer Valley Chinese Immersion Charter	Hampshire	South Hadley	4	2.6
Pioneer Valley Performing Arts Charter Public	Franklin	Northfield	64	15.6
Pittsfield	Berkshire	Pittsfield	994	16.3
Plainville	Norfolk	Plainville	110	13.3
Plymouth	Plymouth	Plymouth	1542	18.5
Plympton	Plymouth	Kingston	36	14.6
Prospect Hill Academy Charter	Middlesex	Somerville	87	8.9
Provincetown	Barnstable	Provincetown	43	28.1
Quabbin	Worcester	Barre	487	16.0
Quaboag Regional	Worcester	Warren	282	19.2
Quincy	Norfolk	Quincy	1459	16.0
Ralph C Mahar	Franklin	Orange	138	17.3
Randolph	Norfolk	Randolph	601	20.5

Reading	Middlesex	Reading	758	17.0
Revere	Suffolk	Revere	935	15.0
Richmond	Berkshire	Lanesboro	15	8.7
Rising Tide Charter School	Plymouth	Plymouth	52	16.7
River Valley Charter	Essex	Newburyport	45	15.7
Robert M. Hughes Academy Charter	Hampden	Springfield	8	4.3
Rochester	Plymouth	Mattapoisett	93	15.4
Rockland	Plymouth	Rockland	394	16.7
Rockport	Essex	Rockport	193	19.5
Rowe	Franklin	Shelburne Falls	7	10.8
Roxbury Preparatory Charter	Suffolk	Roxbury	37	15.0
Sabis International Charter	Hampden	Springfield	184	11.7
Salem	Essex	Salem	1133	24.7
Salem Academy Charter	Essex	Salem	67	21.5
Sandwich	Barnstable	East Sandwich	523	14.4
Saugus	Essex	Saugus	434	14.9
Savoy	Berkshire	Savoy	2	4.8
Scituate	Plymouth	Scituate	384	11.6
Seekonk	Bristol	Seekonk	275	12.5
Seven Hills Charter Public	Worcester	Worcester	71	10.5
Sharon	Norfolk	Sharon	509	14.6
Shawsheen Valley Regional Vocational Technical	Middlesex	Billerica	319	24.5
Sherborn	Norfolk	Dover	59	13.0
Shirley	Middlesex	Shirley	109	20.0
Shrewsbury	Worcester	Shrewsbury	906	15.3
Shutesbury	Franklin	Erving	16	10.4
Silver Hill Horace Mann Charter	Essex	Haverhill	65	11.6
Silver Lake	Plymouth	Kingston	273	14.3
Smith Leadership Academy Charter	Suffolk	Boston	29	17.6
Somerset	Bristol	Somerset	382	13.8
Somerville	Middlesex	Somerville	1078	22.0
Southampton	Hampshire	Westhampton	110	19.6
Southborough	Worcester	Southborough	197	12.5
Southbridge	Worcester	Southbridge	416	18.7
Southeastern Regional Vocational Technical	Bristol	South Easton	334	26.6
Southern Berkshire	Berkshire	Sheffield	140	15.5
Southern Worcester County Regional Vocational Technical	Worcester	Charlton	224	20.1
South Hadley	Hampshire	South Hadley	326	15.2
South Middlesex Regional Vocational Technical	Middlesex	Framingham	281	43.8
South Shore Charter Public	Plymouth	Norwell	67	12.8
South Shore Regional Vocational Technical	Plymouth	Hanover	184	30.9
Southwick-Tolland	Hampden	Southwick	285	15.7
Spencer-East Brookfield	Worcester	Spencer	418	21.0
Springfield	Hampden	Springfield	6089	23.9

Stoneham	Norfolk	Stoughton	470	17.4
Stoughton	Worcester	Fiskdale	651	17.1
Sturbridge	Barnstable	Hyannis	138	15.0
Sturgis Charter Public	n/a	Hyannis	49	12.2
Sudbury	Middlesex	Sudbury	450	14.1
Sunderland	Franklin	South Deerfield	23	12.2
Sutton	Worcester	Sutton	319	19.3
Swampscott	Essex	Swampscott	306	13.4
Swansea	Bristol	Swansea	296	14.1
Tantasqua	Worcester	Fiskdale	280	15.5
Taunton	Bristol	Taunton	1473	18.3
Tewksbury	Middlesex	Tewksbury	782	18.3
Tisbury	Dukes	Vineyard Haven	43	14.1
Topsfield	Essex	Boxford	117	17.7
Tri County Regional Vocational Technical	Norfolk	Franklin	258	26.8
Triton	Essex	Byfield	415	13.0
Truro	Barnstable	Truro	22	15.1
Tyngsborough	Middlesex	Tyngsborough	257	12.6
Up-Island Regional	Dukes	Vineyard Haven	77	24.1
Upham Corner Charter	Suffolk	Boston	n/a	n/a
Upper Cape Cod Regional Vocational Technical	Barnstable	Bourne	146	21.7
Uxbridge	Worcester	Uxbridge	306	15.2
Wachusett	Worchester	Jefferson	1040	13.9
Wakefield	Middlesex	Wakefield	533	15.7
Wales	Worcester	Fiskdale	31	18.2
Walpole	Norfolk	Walpole	590	14.8
Waltham	Middlesex	Waltham	1056	21.7
Ware	Hampshire	Ware	238	17.9
Wareham	Plymouth	Wareham	575	18.2
Watertown	Middlesex	Watertown	469	17.5
Wayland	Middlesex	Wayland	537	19.4
Webster	Worcester	Webster	286	14.4
Wellesley	Norfolk	Wellesley	821	16.6
Wellfleet	Barnstable	Orleans	26	17.7
Westborough	Worcester	West Boylston	482	13.3
West Boylston	Plymouth	W. Bridgewater	149	14.6
West Bridgewater	Hampden	West Springfield	157	12.1
Westfield	Worcester	Westborough	1193	19.5
Westford	Hampden	Westfield	537	10.1
Westhampton	Middlesex	Westford	30	21.4
Weston	Hampshire	Westhampton	367	15.3
Westport	Middlesex	Weston	285	14.9
West Springfield	Bristol	Westport	785	19.6
Westwood	Norfolk	Westwood	513	16.4
Weymouth	Norfolk	Weymouth	1118	15.9
Whately	Franklin	South Deerfield	19	14.3
Whitman-Hanson	Plymouth	Whitman	649	14.4
Whittier Regional Vocational Technical	Essex	Haverhill	264	21.9
Williamsburg	Hampshire	Westhampton	21	12.7
Williamstown	Berkshire	Williamstown	46	10.8
Wilmington	Middlesex	Wilmington	563	14.7

Winchendon	Worcester	Winchendon	342	20.7
Winchester	Middlesex	Winchester	683	16.1
Winthrop	Suffolk	Winthrop	359	18.0
Woburn	Middlesex	Woburn	773	16.1
Worcester	Worcester	Worcester	4980	20.4
Wrentham	Norfolk	Amherst	172	13.4
Number of students receiving special education services: total = 164,238; min = 2; max = 10898 Percentage (%) of students receiving services in schools: average = 16.426%; min = 2.6%; max = 44.1% Based on the estimate 3% of individuals receiving special education have autism, an estimated 4,927.14 students have ASD in MA Based on the estimate that 6% of students receiving special education services were essentially nonverbal, it can be estimated that approximately 9,854.28 students have or may benefit from AAC in MA				
Data gathered from Special Learning. (2011). *National Schools Directory.* Retrieved from http://t1.special-learning.com/Directory/Schools/493. Compiled by Hall, N. (2012).				

APPENDIX B

UNIVERSITY COURSE OFFERINGS

University	Masters	PhD	# of courses	Clinical Service Delivery	AAC Res.	Clinic Exp.
Adelphi University	✔	✔	*1 Intro*			
Abilene Christian University	✔		1 Intro	✔	✔	✔
Arizona State University	✔	✔	*1 Intro*			
Arkansas State University	✔		*1 Intro*			
Auburn University	✔		*1 Intro*			
Ball State	✔		I Intro	✔	✔	
Bloomsburg University	✔		*1 Intro*			
Boston University	✔	✔	*1 Intro*			✔
Brigham Young University	✔		*1 ASD and AAC*			
Buffalo State College	✔		1 Intro			
California State University, Bakersfield					✔	
California State University, Chico	✔		*1 Intro*			
California State University, East Bay	✔		*1 Intro*			
California State University, Fresno	✔		*1 Intro*			
California State University, Fullerton	✔		1 Intro, 1 Instrumental mgnt.		✔	
California State University, Long Beach	✔		1 Intro			
California University of Pennsylvania	✔		*1 Intro*			
Calvin University	✔		*1 Intro*			
Case Western Reserve University	✔	✔	*1 Intro*	✔		
Central Michigan	✔		1 Intro			
Chapman University	✔		*1 Intro*			
Clarion University	✔		*1 Intro*			
Cleveland State University	✔		*1 Intro*			
College of St. Rose	✔		*1 Intro*			
CUNY Brooklyn	✔	✔	*1 Intro*			
CUNY Queens College	✔		*1 Intro*			
Dalhousie University	✔		*1 Intro*			
Duquesne University	✔	✔	1 Intro	✔	✔	
East Carolina University	✔	✔	*1 Intro*			
East Stroudsburg University	✔		*1 Intro*			
East Tennessee State University	✔		*1 Intro*			
Eastern Michigan University	✔		1 Intro for SPED			

Eastern New Mexico University	✔		1 Intro			
Eastern Washington University	✔		*1 Intro*			
Edinboro University of Pennsylvania	✔		*1 Intro*			
Emerson College	✔		1 Intro			
Florida State University	✔	✔	1 Intro	✔	✔	
Fontbonne University	✔		1 Intro, 1 Practical Applic.			
Fort Hays State University	✔		1 Web-course	✔	✔	✔
George Mason University	✔	✔	1 Intro for SPED		✔	
George Washington University	✔		1 Intro	✔		
Georgia State University	✔		*1 Intro*			
Governers State University	✔		1 Intro		✔	
Hampton University	✔		*1 Intro elective*			
Harding University	✔		*1 Intro*			
Howard University	✔	✔	2 AAC assessment, Intro for SLP/SPED	✔	✔	✔
Idaho State University	✔		1 Intro			
Illinois State University	✔		1 Intro, 1 Advanced AAC			
Jackson State University	✔		*1 Intro*			
James Madison University	✔	✔	*1 Intro*			
Kansas State University	✔		*1 Intro*			
Kean University	✔		*1 Intro*			
Kent State University		✔	2 Intro, Independent Study		✔	
LaSalle University	✔		*1 Intro*			
Lamar University	✔		*1 Intro*			
Longwood University	✔		*1 Intro*			
Louisiana Technical University	✔		*1 Intro*			
Loyola University	✔		*1 Intro*			
Marquette University	✔		1 Intro			
Marshall University	✔		1 Intro	✔		
Marywood University	✔		*1 Intro*			
Miami University	✔		*1 Intro*			
Minnesota State University Makato	✔		*1 Intro*			
Minnesota State University Moorhead	✔		*1 Intro*			
Minot University	✔		*1 Intro*			
Misericordie University	✔		*1 Intro*			
Missouri State University	✔		*1 Intro*			
Molloy College	✔		*1 Intro*			
Murray State University	✔		1 Intro	✔		

Nazareth College	✔		*1 Intro*			
New Mexico State University				✔		
New York Medical College	✔		*4 AAC classes*			
New York University	✔	✔	1 Intro			
North Carolina Central University	✔		*1 Intro*			
Northeastern State University	✔		*1 Intro to AT*			
Northeastern University	✔		*1 Intro*			
Northwestern University	✔	✔	1 Intro			
Nova Southeastern University	✔		*1 Intro*			
Ohio State University	✔	✔	*1 Intro*			
Ohio University	✔	✔	1 Intro		✔	
Oklahoma State University	✔		*1 Intro*			
Our Lady of the Lake University	✔		1 Intro			
Penn State	✔	✔	1 Intro	✔	✔	✔
Portland State University	✔		*1 Intro*			
Purdue University	✔	✔	AAC/SPED 1 Intro, 1 Indep. Study, 1 Special Topics, 1 AT in schools, 1 Advanced AT, 1 AAC practicum, 1 AAC research sem, 1 Internship in Ed		✔	✔
Radford University	✔		*1 Intro*			
Rockhurst University	✔		1 Intro			
Saint Louis University	✔		*1 Intro*			
San Diego State University	✔	✔	1 Intro	✔		✔
San Francisco State University	✔	✔	1 Intro SPED/CDis, 1 teaching for SPED	✔	✔	
Seton Hall University	✔	✔	*1 Intro*			
Simmons College	✔		1 Intro for AT/SPED			
Southeastern Louisiana University	✔		1 Intro			
Southern Connecticut State University	✔		1 Intro 1 Adaptive Tech			
Southern Illinois University Carbondale	✔		*1 Intro*			
Southern Illinois University Edwardsville	✔		*1 Intro*			
St. Ambrose	✔		*1 Intro*			
St. Cloud University	✔		*1 Intro*			
St. John's University	✔		*1 Intro*			
St. Xavier University	✔		*1 Intro*			
Stephen F. Austin State University	✔		*1 Intro*			

State University of New York at Buffalo	✔	✔	*1 Intro*			
State University of New York at Fredonia	✔		*I Intro (required)*			
State University of New York at Geneseo	✔		*1 Intro*			
State University of New York at New Platz	✔		*1 Intro*			
State University of New York at Plattsburg	✔		1 Intro			
Syracuse University	✔	✔	*1 Intro (1 credit)*			
Teachers College, Columbia University	✔	✔	1 Intro		✔	✔
Texas Tech University				✔	✔	
Texas Women's University	✔		*1 Intro*			
The University of Georgia	✔	✔	1 Intro	✔		
The University of Memphis	✔	✔	1 Intro	✔	✔	✔
The University of Mississippi	✔		1 Intro 1 Neurogenic/AAC	✔		
Touro College	✔		1 AAC devices			
Towson University	✔		1 Intro			
Tyler Institute, Nova Southeastern University	✔	✔	1 Intro, 1 AAC school-aged, 1 Promoting Literacy, 1 Goal setting, 1 AAC Potpourri, 2 AAC assessment, 1 Beginning com, 1 low tech, 1 advanced AAC, 1 AAC & ASD, 1 advanced issues	✔		✔
University of Akron	✔		*1 Intro*			
University of Alabama, Tuscaloosa	✔		*1 Intro*			
University of Arizona	✔	✔	1 Intro	✔		✔
University of Arkansas, Fayetteville	✔		*1 Intro*			
University of Arkansas, Little Rock	✔	✔	1 Intro	✔	✔	
University of British Columbia	✔	✔	1 Intro			
University of Central Arkansas	✔		1 Intro			
University of Central Florida	✔		1 AAC undergrad 1 AAC grad	✔	✔	
University of Central Missouri	✔		*1 Intro*			
University of Central Oklahoma	✔		*1 Intro*			
University of Cincinnati	✔	✔	1 Intro	✔		
University of Colorado-Boulder	✔	✔	1 Intro			

University of Florida, Gainesville	✔	✔	*2 AAC classes*			
University of Illinois, Urbana-Champaign	✔	✔	*1 Intro*			
University of Illinois at Chicago	✔	✔	Human Dev 1 Intro to AT, 1 AT/AAC/Access, 1 assessment			✔
University of Iowa	✔	✔	1 Intro, 1 Designing AT	✔	✔	✔
University of Kansas	✔	✔	1 Intro	✔	✔	✔
University of Kentucky	✔	✔	I Intro	✔		
University of Louisiana, Lafayette	✔		1 Intro with CP			
University of Louisiana, Monroe	✔		*1 Intro*			
University of Louisville	✔		1 Intro	✔		
University of Louisville – Ed and Human Development	✔	✔	Human Dev 1 Intro		✔	
University of Maryland, College Park	✔	✔	I Intro			
University of Massachusetts, Amherst	✔	✔	1 Intro	✔	✔	✔
University of Michigan Rehab Engineering Program	✔	✔	1 Rehab Engineering, 1 Lab	✔		✔
University of Minnesota Duluth	✔		1 Intro for AT	✔		
University of Minnesota Minneapolis	✔	✔	*1 Intro*			
University of Montevallo	✔		*1 Intro*			
University of Nebraska Kearney	✔		*1 Intro*			
University of Nebraska Lincoln	✔	✔	*1 Intro* *1 Seminar in AAC*			
University of Nebraska Omaha	✔		*1 Intro*			
University of New Hampshire	✔		1 Intro		✔	
University of New Mexico	✔		1 Intro, 1 Adult Neurogenic	✔		
University of North Carolina Chapel Hill	✔	✔	*1 Intro*			
University of Northern Iowa	✔		1 Intro			
University of Oregon	✔		*1 Intro*			
University of Pittsburgh	✔	✔	1 Intro	✔	✔	
University of South Dakota	✔		*1 Intro*			
University of South Florida	✔	✔	I Intro	✔		✔
University of Southern Mississippi	✔		*1 Intro*			
University of Texas, El Paso	✔		*I Intro*			

University of Texas, Pan American	✔		*1 Intro*			
University of the Pacific	✔		*1 Intro*			
University of Toledo	✔		1 Intro 1 Adv. Practicum			
University of Toronto	✔	✔	1 Intro		✔	
University of Tulsa	✔		*1 Intro*			
University of Utah	✔	✔	*1 Intro*			
University of Vermont	✔	✔	*1 Intro*			
University of Virginia	✔	✔	1 Intro		✔	
University of WI-Whitewater	✔		1 Intro	✔		✔
University of Washington	✔	✔	1 Intro			
University of Wisconsin-Eau Claire	✔		1 Intro	✔		✔
University of Wisconsin-Madison	✔		*1 Intro*			
University of Wisconsin-Milwaukee	✔	✔	1 Intro, 1 Assessment		✔	
University of Wisconsin-River Falls	✔		*1 Intro*			
Utah State University	✔		1 Intro	✔	✔	✔
Valdosta State University	✔		*1 Intro*			
Vanderbilit University	✔		*I Intro*			
Washington State University	✔		1 Intro	✔	✔	✔
West Texas A&M	✔		*I Intro*			
West Virginia University	✔		1 Intro	✔		
Western Carolina	✔		*1 Intro and Assessment*			
Western Illinois University	✔		1 Intro			
Western Kentucky University	✔		*1 Intro*			
Western Michigan University	✔		1 Intro for OT			
Western Washington University	✔		*1 Intro*			
Wichita State University	✔	✔	1 Intro	✔		
Worcester State University	✔		*1 Intro*			

Total: 181 of 253 programs offer at least one class in AAC (71.54%)
of the 181 programs, 20 offered more than one course (11.05%)

Information predominantly gathered from http://aacinstitute.thaleus.net:8080/NEW_UAD/show_list.tcl. Rows with italicized text contain information gathered from http://hes.asha.org:8080/EdFind/Masters/MastersSearchResults.aspx. Compiled by Hall, N. (2011)

APPENDIX C

IRB FORMS

University of Massachusetts Amherst
School of Public Health and Health Sciences
Human Subjects Review Committee
(SPHHS-HSRC)

DATE: June 24, 2010

TO: Nerissa Hall and Mary Andrianopoulos

FROM: Alayne Ronnenberg, Chair SPHHS-HSRC

SUBJECT: ***SPHHS-HSRC file #***: 10-42

The following action resulted from human subjects review of the proposal you submitted:
"Development of an Augmentative and Alternative Communication (AAC) Training Program"

- **1a**. The ***SPH&HS-HSRC,*** after full review by primary reviewers, has ***APPROVED*** the above proposal.

X 1b. Your protocol has been APPROVED by the *SPHHS-HSRC* after expedited review under 45CFR46.110(b).

Good luck with your study.

Alayne Ronnenberg, ScD
Chair, 2008-2009 SPHHS-HSRC

APPENDIX D

CONSENT FORM

Consent Form for Participation in a Research Study
University of Massachusetts Amherst

Principal Investigator:	Dr. Mary Andrianopoulos
Co-Principal Investigator:	Dr. Yu-kyong Choe
Student Researcher:	Nerissa Hall
Study Title:	Development of an Augmentative and Alternative Communication Training Program

1. WHAT IS THIS FORM?

This form is called a Consent Form. It will give you information about the study so you can choose if you would like to participate.

2. WHO IS ELIGIBLE TO PARTICIPATE?

Participants include future and current members of an augmentative and alternative communication (AAC) team. AAC refers to ways of communicating, such as using pictures, using a computer which "speaks", using sign language/gestures, and writing. Members of an AAC team can include a person who uses AAC (an AAC user) or people who work with somebody who uses AAC. AAC teams often include graduate student clinicians in Speech Language Pathology (SLP), certified and licensed SLPs, individual AAC users, paraprofessionals/ETAs, and parents/guardians of AAC users. Graduate student clinician participating in this study will be enrolled in the University of Massachusetts, Amherst's Communication Disorders program. Graduate student SLP clinicians and paraprofessionals will complete questionnaires to measure their AAC knowledge and skills. Data will be collected to ensure that the students using AAC are making progress towards their communication goals.

3. WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this research study is to determine what helps members learn more about AAC. This information will help the research team develop a training program that improves AAC team members' knowledge and skills about AAC.

4. WHERE WILL THE STUDY TAKE PLACE AND HOW LONG WILL IT LAST?

The study will be done during the extended school year. The AAC user and members of the AAC team will receive weekly AAC services for a minimum of 4 weeks maximum of 5 weeks. Information will be collected from questionnaires, surveys, and goal monitoring.

5. WHAT WILL I BE ASKED TO DO?

AAC users: You will participate in AAC therapy and data will be collected to help you achieve your therapy goals.
AAC team members: In addition to engaging in the 5 week program you will be asked to complete 2 surveys (that take about 5-20 minutes to complete) at the start of services, and then again and the end of services. Surveys will include rating scales using simple check-boxes, and some short-response questions which will require written answers. All questions will be about your experiences and knowledge with AAC and AAC services.

6. WHAT ARE MY BENEFITS OF BEING IN THIS STUDY?

You may not directly benefit from this research; but we hope that your participation in the study may provide important information about effective methods for teaching people about AAC and how to use AAC in other environments. This information will help the researchers develop an AAC training program for future SLPs and individuals working with AAC users and devices. This will ultimately help AAC users.

7. WHAT ARE MY RISKS OF BEING IN THIS STUDY?

We believe there are no known risks associated with this research study; however, a possible inconvenience may be the time it takes to complete the study.

8. HOW WILL MY PERSONAL INFORMATION BE PROTECTED?

The researchers will keep all study records (including any codes to the participants' data) in a locking file cabinet. Research records will be labeled with a code. A master key that links names and codes will be maintained in a separate and secure location. All electronic files (e.g., data sheets, spreadsheets, videoconferencing sessions, etc.) containing identifiable information will be password protected. Any computer with such information will also have password protection to prevent access by unauthorized users. Only the members of the research team will have access to the passwords. At the end of this study, the researchers may publish their findings. Information will be presented in summary format and you will not be identified in any publications or presentations.

9. WILL I RECEIVE ANY PAYMENT FOR TAKING PART IN THE STUDY?

You will not be paid for taking part in the study.

10. WHAT IF I HAVE QUESTIONS?

Please take as long as you like before you make a decision. We will be happy to answer any questions you may have regarding this study. If you have further questions about this project or if you have a research-related problem, you may contact the principal investigator, (Dr. Mary Andrianopoulos, 413-545-0551), or the student researcher **(Nerissa Hall, 413-374-3056).** If you have any questions concerning your rights as a research subject, you may contact the University of Massachusetts Amherst Human Research Protection Office (HRPO) at (413) 545-3428 or humansubjects@ora.umass.edu.

11. CAN I STOP BEING IN THE STUDY?

You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate.

12.WHAT IF I AM INJURED?

The University of Massachusetts does not have a program for compensating subjects for injury or complications related to human subjects research, but the research team will help to get treatment.

13. SUBJECT STATEMENT OF VOLUNTARY CONSENT

I have read this form and decided that I will participate in the study described above. The general purposes and details about the study, as well as possible risks and inconveniences have been explained to my satisfaction. I understand that I can drop out at any time.

_____	_____	_____
Participant Signature:	Print Name:	Date:

_____	_____	_____
Parent/Guardian	Print Name:	Date:

By signing below I indicate that the participant has read and, to the best of my knowledge, understands the details contained in this document and has been given a copy.

_____	_____	_____
Signature of Person Obtaining Consent	Print Name:	Date:

Photograph & Video Release Form

I give you permission to record my image, likeness and sound of my voice as recorded on audio or video tape without payment or any other consideration. I understand that my image may be edited, copied, or published and waive the right to inspect or approve the finished. Additionally, I waive any right to royalties or other compensation related to the use of my image or recording. I also understand that this material may be used for educational purposes in diverse educational settings.

Photographic, audio or video recordings may be used **only** for the following purposes:

- conference presentations
- educational presentations, courses, or videos
- informational presentations
- on-line educational courses
- website use (University of Massachusetts affiliated websites only)

I will be consulted about the use of the photographs or video recording for any purpose other than those listed above.

This release applies to photographic, audio or video recordings collected as part of the Clinical Research Training program only. There is no time limit to this release nor is there a limit to the geographical location of where these materials may be shown.

By signing this form I acknowledge that I have completely read and fully understand the above release and agree to the conditions. I hereby release any and all claims against any person or organization utilizing this material for educational purposes.

Full Name_____

Street Address/P.O. Box_____

City _____

Prov/Postal Code/Zip Code_____

Phone _____ Fax _____

Email Address_____

Signature_____ Date_____

If this release is obtained from a presenter under the age of 18, then the signature of that presenter's parent or legal guardian is also required.

Parent's Signature_____ Date_____

APPENDIX E

CLIENT PRE-POST SCREEN

Pre-Post Parts of Speech and Morphology Checklist: **Client Initials:** **Pre** ☐ **Post** ☐

Attempt to elicit target morphological feature. Do not provide prompting. If unable to elicit after 3 attempts provide prompting to determine if stimulable for the target feature. Not whether elicitation was prompted (p) unprompted (+), or not achieved (-).

Target	Morphology	Sample Probe Question/Statement	Elicitation				
			1	2	3	4	5
1	Plural "s" (apples, toys, colors)	I see two _____, what do you see?					
2	First / second person (I, me, you}	I like _____, what do you like?					
3	Gender/Subjective Pronouns (he, she, they)	He is _____ and (point to other character)					
4	Present progressive (-ing ending)	He is jumping and she it _____					
5	3rd person singular (-s ending)	He eats and she _____					
6	Uncontracted aux/copula (is/are)	I am reading and _____					
7	Regular past tense (-ed ending)	This boy played and this girl ____					
8	Prepositions (in, out, off, on)	He is on and she is _____					
9	Negative phrases	He is not happy, she is _____					
10	Future tense (going to and will)	He will play, and she _____					
11	Object Pronoun (him, her, us, them)	Give this to them and give this to ____					
12	Possessive Pronouns (his, hers, ours, theirs)	This is the girl's hat and this is the _____					
13	S-V inversion (can I...?)	He asks "can I play" and the girl asks ____					
14	Question words (what, where, who, etc.)	He asks "what is that" and she asks ____					
Target	**Parts of Speech**	**Client's Examples**	**Elicitation**				
			1	2	3	4	5
15	Nouns (book, game, house)	Book, sailboat, cow, fish					
16	Verbs (run, eat, sleep)	Swim, read, want					
17	Adjectives (big, little)	Blue, delicious, hungry, thirsty – most colors					
18	Pronouns (he, she, I)	I, you, it – unable to elicit others					
19	Adverbs (quickly, slowly)	-					
20	Interjections (oh, wow)	-					
21	Prepositions (in, on, out)	With – unable to elicit others					
22	Conjunctions (and, because)	-					
23	Articles (a, an, the)	-					
Comments:							

APPENDIX F

WEEKLY PRE-PROFESSIONAL CLINICIAN SURVEY

ACTIVE CONSULTATION PARTICIPATION SURVEY

Name:			Research ID (UMass Research Staff only):		
Person filling out form (if participant is a minor or unable to do so):					
Date:	Week 1 ☐	Week 2 ☐	Week 3 ☐	Week 4 ☐	Week 5 ☐
Week 6 ☐	Week 7 ☐	Week 8 ☐	Week 9 ☐	Week 10 ☐	Week 11 ☐

This survey is an important part of our research and it will help to determine the quality of services that were delivered. The results of your feedback will be carefully examined and used to make decisions regarding the feasibility of "Active Consultation" when compared to other supervisory methods. *Your responses will be held in the strictest confidence.*

For each question below, circle the number that best fits your judgment.

Question	Scale				
	Not Very Good	Below Average	Average	Above Average	Very Good
Delivery of supervisory feedback during the session (Active Consultation, eSupervision, traditional, etc)	1	2	3	4	5
The quality (relevance) of the feedback you received via supervision	1	2	3	4	5
Your ability to communicate with the CLINICIAN during the session	1	2	3	4	5
Your attitude about the supervision you received.	1	2	3	4	5
How effective do you think this form of supervision was/is on the service you provide?	1	2	3	4	5
What is the likelihood that you would recommend this form of supervision to your colleagues?	1	2	3	4	5
Additional Comments: please take the opportunity to describe the advantages, disadvantages, pro's and con's of the services provided via Active Consultation during this session.					

APPENDIX G

DATA COLLECTION FORM

Data Log – Week _____

Client Initials: Clinician Initials: Supervisor:

Session Data:	Coder #1	Client		+ indepen. - incorrect p prompted
		Clinician		+ indepen. - incorrect p prompted
	Coder #2	Client		+ indepen. - incorrect p prompted
		Clinician		+ indepen. - incorrect p prompted

Active Consultation Data:	Coder #1	Instructional Prompt		+ indepen. - incorrect p prompted
		Reinforcing Prompt		+ indepen. - incorrect p prompted
	Coder #2	Instructional Prompt		+ indepen. - incorrect p prompted
		Reinforcing Prompt		+ indepen. - incorrect p prompted

Session Data:	Coder #1	Client		+ indepen. - incorrect p prompted
		Clinician		+ indepen. - incorrect p prompted
	Coder #2	Client		+ indepen. - incorrect p prompted
		Clinician		+ indepen. - incorrect p prompted

Active Consultation Data:	Coder #1	Instructional Prompt		+ indepen. - incorrect p prompted
		Reinforcing Prompt		+ indepen. - incorrect p prompted
	Coder #2	Instructional Prompt		+ indepen. - incorrect p prompted
		Reinforcing Prompt		+ indepen. - incorrect p prompted

APPENDIX H

THE ADJUSTABLE J-MOUNT©

The Adjustable J-Mount

Visit
www.aaccommunicare.com/JMount

for more information

The Adjustable J-Mount…

…is designed to support synchronous and asynchronous telepractice services for individuals using augmentative and alternative communication (AAC) and assistive technology. The flexibility of the J-Mount arm allows the mounted webcam to capture a clear image of the AAC screen. Furthermore, the J-Mount can be adjusted to survey the surrounding environment, or be positioned as to allow for observation of a range of behaviors.

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